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ORGANIC GARDENING—Emmaus, Pa.

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With The Editor

The Beneficial "Fire" In the Soil

THERE have been reported cases in England, where, after fifteen years of organic fertilizing, the land became so rich that bountiful crops were grown for four or five years without any further outside fertilizer applications. It is not altogether a matter of nutritional elements, that is, nitrogen, phosphorus, potash, and the other soil constituents, but it is more a question whether the digestive processes of the soil are functioning in a healthy manner, so that these substances may be properly broken down and fed to plant roots. It is a matter of the biologic condition of the soil, not its chemical make-up, which plays such an important role in the interplay of the complex soil forces.

A witticism that has been attributed to Mae West, expresses this point beautifully, though I hope my readers will pardon this vulgar comparison. She said, "It isn't the men in my life, but the life in my men." It is the life in the soil that counts. You can get the proper feeling of it if you imagine a tiny fire burning in the soil, a fire that is almost cold; it never gets beyond that stage. I say a fire that is almost cold, as fires go. Actually it has to have a degree of warmth.

Earthworms, bacteria, and fungi, the three musketeers of the soil's fertility, require that degree of warmth to function effectively. The three interact and help each other. Both the earthworm and the microbe operate as a team, and move about in that little fire, making things easier for each other.

The earthworm, by means of its calcareous glands alkalinizes the soil, it counteracts the acidity which is so destructive to soil microbes. It chews up raw organic matter, performing one of the preliminary operations which saves labor for bacteria. It burrows into and aerates the soil. Beneficial microorganisms can operate only in the presence of oxygen which you find in abundance where the earth is well aerated. By means of its burrows it permits moisture to penetrate, which is so essential for optimum microbial activity.

No scientific studies have been made as to the relationship between the common angleworm and bacteria in the soil. Our agricultural scientists have been too busy studying the sundry chemicals and poison sprays, plant and animal diseases and showing the farmer's wife how to make a dress out of a flour bag. So, nothing positive can be stated as to what the bacteria does to friend earthworm. However, Charles Darwin, in his famous work on this helpful little creature, has shown, that an earthworm does not attack a fresh leaf, but will do so only when it is partially broken down. In this process, bacteria and molds take a prominent part. So we have an example of how the bacteria do something for the earthworm.

Coming back to the little "fire" in the soil, you might call that process metabolism, or digestion, or respiration, or oxidation, but to my unscientific mind, it is a "fire", a tiny conflagration that is kept within safe bounds by the benign forces of Nature. It needs to be kept going as you would a furnace. The right kind of kindlings are organic materials such as well-

made composts, bone-meal, and dried blood. Mild rock powders such as limestone, phosphate rock, and dolomite will help the fire burn without burning.

Strong chemical fertilizers will have a decidedly inhibitory influence on the fire, although at first it will make the flame flare up and burn strongly. The final effect will be to dampen it considerably, and if over-persisted for a long time without the addition of manure, will make the fire go out. Then the soil is said to have lost its fertility. Readers ask us whether they shall use chemical activators in the compost heap. If they do, it would be like adding cinders to coal to increase the volume of the fuel.

It is the ash from the burning process that furnishes the basis for the diet of plant roots. If the fire is feeble or practically non-existent, the roots will be hard put to forage about for sustenance. Anyone who has watched and studied roots knows what a wonderful mechanism they are. By hook or by crook they will forage about and get food for the plant above. They can even get it from raw chemical fertilizers, even though for millions of years roots had no experience with this corrosive kind of material which burns too strongly. But roots like the contact with the gentle warmth, the little fire of a soil rich in humus. They are happiest that way and can do their best work under those conditions.

A very important way in which compost and humus contributes to the warmth of the soil is the way it darkens it. You may start with a yellowish soil. Constant applications of compost will gradually darken it until it becomes almost black. The darker a substance is, the more it will absorb heat. For that reason a black horse will suffer more from heat than a white one. That is why so much white is worn in the tropics. A barn painted white will keep the stored grain cooler in summer than the so-common red barns. In the spring a difference in temperature between a light and dark colored soil has been found to be as much as ten degrees. This is a remarkably essential factor in keeping the soil fires burning.

A very interesting aspect of this phenomena was illustrated by Lady Eve Balfour in The Living Soil, a book which Organic Gardening Magazine has contracted to publish in about six months. She demonstrates the considerable part that fungi assume in the breaking down of organic matter.

An experiment was performed in which cotton-wool pads were buried for four months in three different kinds of soil. One was an untreated Wareham soil. This is the forbidding Egdon Heath of the famous Hardy novels. The second was ordinary woodland soil and the last was Wareham soil treated with good compost.

"At the end of the period", says Lady Balfour, "what was left of these pads was dried and reweighed. Representative results based on many repetitions of the experiment showed that in untreated Wareham soil only 10 per cent of this cellulose had been decomposed, in the woodland soil the figure was 33.6 per cent, but in Wareham soil plus compost the percentage of decomposition was over 91 per cent." Lady Balfour mentions another case where the rate of cellulose decomposition was observed in cultivated fields. "The indications were that the highest rate of cellulose decomposition would be found in fields that had received compost, and the lowest in those that had received artificials." It is all due to the little fire.

After a soil has become exceptionally fertile its rate of decomposition of organic matter increases. A point is reached, as stated in the first paragraph where the land can sail along for three or four years without the use of any more compost. Now, if there is this little fire burning in the soil, and no compost is put in, why wouldn't it burn the fertility out altogether? There is an extremely interesting reason why this does not happen, but it would require too much space to include it in this editorial. Look for it in the next issue. In the meantime try to think up your own answer.

J. I. RODALE

Compost and Healthy Soil

By SIR ALBERT HOWARD, C. I. E.

BEFORE dealing with the general question I should like very briefly to traverse some of the views expressed by Dr. Ogg, Sir Frank Engledow, Dr. Salisbury, and the Secretary of the Agricultural Research Council as recorded in the minutes of a meeting of the A. R. C., held on March 14th, 1945 (A. R. C. 7898). That these statements should have been made explains, I think, why the work of the A. R. C. has reached its present condition of complete sterility.

Dr. Ogg says that there is no evidence to show that balanced artificials injuriously affect the yield, the feeding value, or the disease resistance of crops. I will quote one instance out of many which demolish this attitude.

When the celebrated pastures of South Lincolnshire were first put under potatoes, high-quality crops as heavy as 25 tons to the acre were produced. As long as the original stores of humus lasted there was no disease and no change of seed was needed. The use of farm-yard manure and artificials combined has in the course of time produced the following results: yield, quality, and keeping power have fallen off almost to half: the crops have now to be dusted with copper salts as often as twelve times a year to keep off blight: the haulm has to be destroyed with strong sulphuric acid to keep the disease from spreading to the tubers: two new diseases—virus and eelworm—threaten the very existence of the industry: all are agreed that quality and keeping power have steadily deteriorated: the seed has to be changed every three years to keep the industry going.

Balanced manuring with artificials has, therefore, brought the Lincolnshire potato industry into serious difficulties. What is perhaps most significant is that the crop has lost the power to reproduce itself.

How very different is the history of potato cultivation in Tristan da Cunha, where organic manuring with seaweed is the rule. Here there has been no need to change the seed for 100 years. I have this on the authority of Major Irving B. Gane, the Secretary of the Tristan da Cunha Fund who (and his father before him) has organized the dispatch of stores to this lonely island.

Both Mr. Ogg and the Secretary of the A. R. C. refer to the conjoint work of Rothamsted and the Dunn Nutritional Laboratory at Cambridge on the effect of manuring on quality. These statements are based on the Broadbalk wheat plots at Rothamsted. These Rothamsted experiments are scientifically unsound and the results misleading because the manurial treatment has no opportunity of impressing itself on the wheat plant. *The seed used in sowing these plots was changed every year. The plots have had a fresh start at each sowing. Had the seed of each plot been used to sow itself, then these experiments would have long since come to an end because, as is known from other crops, the plant would have lost its power to reproduce itself.*

Failure to realize this weakness rules out both Rothamsted and the Dunn Nutritional Laboratory in any future consideration of the important subject under discussion. Both these institutions have written themselves off so to speak.

Sir Frank Engledow said that farmyard manure might increase the liability to disease. The opposite is true. It helps to confer on the potato the power to resist parasites. I will quote

one example out of many. In a garden in South Westmorland potatoes have been grown on the same land for forty-five years solely by the help of farm-yard manure without disease of any kind—in the garden or in the clamp.

Dr. Salisbury's statement is an unconscious contribution to the gaiety of nations. He quotes the effect of artificials on the life of orchids. They produce great vigor and profuse flowering, but the orchids often die prematurely. The orchids are mycorrhiza formers. Artificial manures destroy this association.

The impression I formed on reading these minutes is that all four of the Government experts—Ogg, Engledow, Salisbury, the Secretary—are trying to obstruct a straightforward trial on the land because they fear the verdict of Mother Earth will go against the vested interests which control both them and the Ministry of Agriculture.

So much for criticism: Now for constructive suggestions.

I am convinced the only way to proceed in this matter is by means of large-scale practical tests on the land as urged by Lords Teviot, Geddes, and Portsmouth. At all costs we must avoid allowing this subject to get involved in the obscurities of the conventional methods of the laboratory hermits—small plots and—statistics. This will only delay matters. Further, once statisticians are furnished with numbers they are capable of proving or disproving anything.

In the large-scale trials, which are essential, we must use the greatest experts of all—the grazing animal, the rat, and the earthworm. All these have a great flare for indicating high quality—the thing that really matters

I suggest the following simple experiments should be pressed for. They will, of course, be duly turned down by the A. R. C., but they can easily be carried on by any landlord on his own property. The results will furnish material for a future debate in the House of Lords.

To make a soil healthy so that it can produce high-quality produce we must do two things: (1) break up the soil pans by means of a sub-soiler so as to restore the circulation of minerals between the sub-soil and the soil and to let in air for humus manufacture in the soil, and (2) increase the supply of humus for the crop. Once all this is done we need no artificial manures at all.

(*To be continued in next issue*)

Christian Science Monitor Praises Soil Builder

Under the date line September 29, there appeared a report in the *Christian Science Monitor* from Hinsdale, Ill. by staff correspondent Dorothea Kahn. The hero is Mr. Larson who produced a fine top soil for his property by using the layer compost method. In turning, he uses a manure loader such as we described in a different place in this issue. Everything said in this article, which was probably read by thousands, confirms the organic method. To quote just one example: "Their potato plants have no bugs, need no spraying. Other plants in their garden are noticeably pest-free." How long did it take them to transform a dump lot into a garden that produces wonderful crops? Just three years of composting.

ROSA SETIGERA

J. H. McFarland

Two-Story Rose Plants

By J. HORACE McFARLAND

EDITOR'S NOTE: Author of Many Rose Books, (*Modern Roses II, The Rose in America, Roses of the World in Color*) Guiding Spirit of the *American Rose Annual,* beloved and admired Rose Authority for many decades, Dr. McFarland is internationally known through his great and good work.

WHEN one who reads "Two-Story Rose Plants" sees a plant thrusting forth its beautiful blooms and he knows that plant to be a rose, he may not need assurance that it is the same rose all the way down into the ground. Yet more than ninety times in a hundred, what he sees is a sturdy rose growing on another rose which several years previously had received the bud of the variety it was designed to perpetuate. Not many roses in commerce are grown on their own roots, though it is better if the hardy climbing roses, the Rugosas and the species roses, about which I am not now writing, are propagated on their own roots. The own-root process will give good roses, without doubt, but it takes much longer, and the reason for using budded roses is largely a reason of time. There are those who insist, with something to back that insistence, that the vigor of the understock, as it is called, contributes largely to the prosperity and success of the budded variety above which blooms and is fragrant "on its own."

I can remember the time when, a little more than a generation ago, the only roses in commerce were either imported budded roses or the so-called "own-root" roses, which were truly so, though they came so weak and spindling that in one very careful trial I secured less than ten per cent of usable, transferable plants out of a batch of 150 carefully nurtured rooted cuttings. This is not the place to discuss the merits of either one or the other, but it is only fair to say that the conventional purchase of a rose is almost invariably of a budded rose.

The reason for this has above been hinted at. Because a bud is deftly inserted under the lifted bark of the understock plant one summer, the resulting new rose, as it becomes, will frequently give an abundance of good blooms without any particular trouble the next season, and this saves one whole year over the obtaining of a plant by means of rooting a cutting.

Naturally, under these commercial conditions much attention has been paid to the understocks on which roses are thus more rapidly increased. When I began to know about roses, those imported from Belgium and Germany and occasionally from France and England were always on what was known as the Manetti stock, which is described in Modern Roses II as "a horticultural variety of R. noisettiana." If I hunt far enough, I can find the story of the man who sent out this understock variety, which blooms rather beautifully if it is let alone to do that, but that has really almost nothing to do with our subject of rose understocks because now Manetti understocks are used only by a few of the greenhouse growers of roses, and practically never by those who grow roses by the million for the gardens of America. Mentioning the Manetti understock, therefore, disposes of it so far as I am concerned, because it is no longer current in garden use. The most largely used understock in America is Rosa multiflora. This seems to be an Asian form which has many specific names not important here to present. It provides a strong-growing plant

ROSA MULTIFLORA — J. H. McFarland

with a disposition to branch freely, to make excellent roots, and to be easily transplantable. Multiflora understocks are produced very readily from cuttings, and there are those who take some pride in growing understocks that have been produced from selected seedlings which have claims of inherent advantage. Others, and indeed I suppose the majority of the growers, sow the beautiful red hips of the abundantly produced Multiflora rose, and obtain by a rather intricate process seedlings which when planted out in rows become in a season the plants to which the new rose varieties may be budded. These plants, if they are properly graded and well cultivated, produce most excellent subjects for the extension of any rose variety budded upon the stems. It is a current practice that after the bud has "taken" the rest of the plant is cut away so that all the vigor of the root goes into the pushing of the one bud which was selected for that purpose. There are many rather intricate modifications in this process which it does not seem in point here to discuss. Something more than twenty-five million plants are produced each year on Multiflora roots, and it is going to take a very good subject to favorably change that practice.

England doesn't do it that way. The common Dog Rose of the hedges has long served as understock, and the English growers much prefer the Canina understock. It is not as easy to handle in America as is Multiflora, and while the real father of American roses, the late Dr. Walter Van Fleet, used Canina understocks for the multiplication of his originations, the result was not always as fortunate as he wanted it to be, because Canina introduces itself with great ease so that the variety one thinks he is propagating is not there at all. I could tell quite a story about one of Dr. Van Fleet's good roses which I almost lost because the Canina understock overwhelmed the new variety in the course of time.

Much effort has been made to find a better understock, and at the Iowa State College, at Ames, Dr. Maney has made very important experiments looking toward the development of superior understocks based upon the hybridization of several rose species.

Other species, including Rosa setigera and a form of R. gigantea, have been used, but not with any great effect. It is therefore best to assume that for quite a while yet the roses of America will be grown on R. multiflora understocks and that English roses will come on R. canina.

Any reader of Organic Gardening who is experimentally minded may readily delve into this subject for himself. Rose hips are easily obtainable and with a little care may be so planted that they will grow and provide understocks on which he may bud any varieties he pleases. I have a friend in Washington who is an enthusiastic and successful rose grower, and I remember that when I obtained the first shipment of Australian roses which had to be planted here on the basis that our winter was their summer, I wanted very much to assure myself against losing these precious new possessions. Dr. Whitman Cross gladly accepted wood of many of these new things, and he secured prompt results by budding the new varieties on some of his hardy climbing roses. I have, indeed, seen one single long branch of a climbing rose on which various different buds had been inserted, which had "taken" to the extent of a half-dozen. The idea was that these would later be cut apart and rooted so that each was a separate individual rose. I have seen a new variety tried out by inserting a bud on a vigorous climber which, encouraged and coddled a little, managed to produce roses the same season.

This practice, however, is not easy, and is mentioned only as part of the advantage of variety in one's growing attempts and experiences. It seems to me that there is a good bit of fun in using Nature's kind willingness when one operates with some independence of conventional methods. One never knows what he can do until he had failed at least once.

J. H. McFarland

ROSA MULTIFLORA

J. H. McFarland

ROSA CANINA

Returning Soldiers Look To the Land

"SO YOU still pull for Texas, do you? Well, maybe, I'll take a good long look at it when I go out West. For me it remains California. I have the bug, the so-called California Wonder. You too should see it before you decide on settling. I have no objections to Texas, but California has the It. Meanwhile, how about giving me another load of manoor?"

JOKI, Florida.

—o—

"I AM a serviceman not yet discharged from service; but as always I've kept my eyes and ears open for agricultural and gardening news. I am deeply interested in farming which is my chief way of making a living for myself. Recently, I've come in contact with one of your issues of ORGANIC GARDENING. Some of the articles attracted my attention and have occupied my thoughts ever since. Perhaps you could send me your latest issue so that I can subscribe?"

RICHTER, California

—o—

"I HAVE just returned home after two and a half years in the army and I've been catching up on some of the periodicals that have kept coming throughout that time. I'm having a very good time going through Organic Gardening. Let me say that I think you've made a very fine thing indeed of the magazine. It far exceeds my anticipations when I received the few copies to arrive before I had to go play soldier. Now that I'm back I regret my city lot more and more, I regret, also, my forty years as a city boy, for I certainly wish I had enough know-how to spend the next—and best—twenty on a small farm of my own. I like the idea of working for one's own self, and I particularly like the idea of producing for self use and of being as much self-dependent as the small farmer is. . . .

"If I had liked the deeper intricacies of accounting more and had continued in that line of business enough, I think I might try to set myself up as an accountant-bookkeeper for farmers. Certainly farmers could do with a part-time bookkeeper who would visit them off and on and help them keep their records. Even the smallest farm could profit by a rudimentary system of cost accounting, and I should imagine most small farmers could use some help in preparing tax returns. Such a sideline could furnish some cash income for a chap who had a few acres of his own with a kitchen garden, some fruit trees, bees, a few rabbits and a couple of goats.

"I am laying plans to improve the fertility of the ground of my lot by composting. . . "

BURLESON, California.

—o—

We have a suggestion for some man with business gifts and interested in a sideline. Every week we get a dozen letters or so from all parts of the country by people who would like to get a few hundred pounds of crushed limestone, dolomite, and phosphate rock. Those materials are usually sold in carload lots. In every state someone could set up a retail business for these important fertilizers. Through Organic Gardening, as an advertising medium, he can reach his customers.

—o—

Another one, geese are easily handled and fed; downs are plucked from the live geese; feathers sell extremely well and are just beginning to be used by industry for the making of light-weight warm clothes and dress material. Better still, if a member of the family is good at quilting, she could produce high-priced feather quilts from home-grown produce and sell them by mail order.

J. H. McFarland

ROSA CANINA

Lamb's Quarters

By HEINRICH MEYER

LAMB'S Quarters is a name commonly allied with the weed plants Chenopodium and Atriplex. The latter is known also as a garden plant under the name of Orach or Orache. Both are among the early greens in spring and have served humanity for thousands of years as food plants. They are rich in starch and make good "spinach". Incidentally, the garden spinach as well as the garden beet and the flower Kochia, often referred to as Summer Cypress, are close relations of these species.

Speaking of species, it may not be amiss to show how plants are named. So often when we read about plants we are startled by Latin names that we might wonder about the usefulness of Latin designations when good common ones are available. Is it merely to show off that the catalogues give us Latin names behind the English ones? Not at all, as we shall presently demonstrate.

If you spoke of "Jimmy" without giving the family name "Jones", you might be misunderstood, since there are, of course, other Jimmies. But since there are also other Joneses, it might be necessary to go one step further and say James Jones of Poughkeepsie. If you want to be precise, you can also add the birthday, as is required in most official records. The same is done with plants.

You find the Latin name *Chenopodium album, L.*, which means *White Chenopodium, named by Linnaeus in* 1753. *Chenopodium* or *Goosefoot* is the generic name, *album* or *white* indicate the specific plant. The wider family connections are obvious, since the botanist could tell you right away that *Chenopodium* is a member of the *Chenopodiaceae,* which shows you a relationship to others of the same family, such as we mentioned (Spinach, Beet, etc.).

It would be erroneous to think that there is no confusion among botanists. Just compare two books by two authorities, let's say, Britton's *North American Trees* and Rehder's *Manual of Cultivated Trees and Shrubs.* You will be surprised to see that the best experts cannot agree on the names. The reason for this is twofold: First, there is a rule that the one who gave the first name to a plant has the right of priority over others who, unknowingly perhaps, gave the same plant another name later, thinking that nobody had as yet identified it. This means, of course, that a botanist must know where to check up. Quite often, some further study reveals that the plant was named earlier than suspected and that the earlier name must go into the books. Right away, you have a confusion. The second reason is simpler. Assume that someone studied all those *Chenopodiaceae* which we mentioned, all those orachs, spinaches, and Kochias. He looked up the dried specimens in the herbarium of the Botanical Gardens and came to the conclusion that different plants were given the same name by different people. Naturally, he will then separate the different ones and give each one its proper name, as he sees it. If you know human nature, you can be sure that others will disagree and insist that the new names are useless, that the plants really are all the same. But just the same, you have a set of new names to contend with. This makes the naming of plants a rather controversial business which requires big libraries and herbaria to settle.

Of course, if now you actually obtained seeds of these various plants and wanted to determine whether they weren't after all the same by growing

them side by side in a given plot, you would get another surprise. Clausen, Keck, and Hiesey published recently two volumes in the series of the Carnegie Institution of Washington, entitled, *Experimental Studies on the Nature of Species*. They grew the same plant in different soils at different altitudes in the Californian West and observed differences in appearance due to the differences in environment. What is an inherited, what an environmental difference? How much of the variations is due to the species, how much to conditions outside the plant? For we know, of course, that nature always goes on and that no plant remains the same throughout the ages. Thus, we have a bunch of changing names and a great variety of variable plants. . .

Nevertheless, it is astonishing how easily we can get together on the names of most common plants. Looking at Britton's *Illustrated Flora,* I discover three entirely different "Lamb's Quarters." First, one which is also called Wake-robin, Birth-root, Nosebleed, Orange-blossom, Squaw-flower, True-love, and even Shamrock, in Latin *Trillium erectum L.* One Latin name and none other. The second Lamb's Quarters we find is also called White Goosefoot, Pigweed, Wild Spinach, Frostblite, Baconweed, Muckweed, Fat-hen, and in Latin *Chenopodium album L.* There are four other Latin names given, but they always preserve the Chenopodium or generic name. So there is little to search about and we can trust Britton that he or his helpers checked up and found that all these plants were the same, just differently named. The same we can assume when we come to the third Lamb's Quarters, the halbred-leaved orach or fat-hen again, in Latin *Atriplex hastata.* The writer says rightly that there are many races, different in leaf form and width of bractlets (or leaf parts.) Where such different varieties, strains or races exist, different names were bound to crop up, because different observers were naturally inclined to draw the division line between species and variety more or less loosely. The temptation to make a new name is always great, because it commemorates at the same time the author of the name. Who wouldn't like to have his initials affixed to a plant from now until the end of days?

You have probably by now had enough about names and confusion in names, a matter which really should concern the botanist alone, but which we must make clear at times in order to show why Latin names cannot be done away with even in so simple a matter as the "common weed, Lamb's Quarters" . . . . . it signifies three different spécies, in two widely different

families, and only the Latin name can tell us which is meant. But what kind of plants are these three Lamb's Quarters? How about stepping from these names into the garden and look at the plants themselves.

The orachs and goosefoot plants have great similarity in leaf shapes. A scientific description would bring out differences, but you might yet confuse

the plants as they grow on the side of your barn, near a trash pile, on a vacant lot where debris from a house was unloaded, or anywhere else on waste places. For both plants are lovers of alkaline soils. They would thrive near the sea coast and amid the plaster from the dump truck. True, the orachs are distinguished by the mealy crystals in their leaves, really starch grains that allow the plants to check evaporation under dry conditions, but the final mark of distinction is in the seeds. For both species and all related ones have seeds rich in starch and are therefore quite good for poultry feeding.

The goosefoot seeds are black and at first not easily seen, because they appear in great numbers packed closely together on a long string and covered, while the orach seeds are enveloped by two envelopes which are connected only at the base. Instead of being strung along the stem, they come in clusters. If you looked only at the leaves which are known for their great variety, you would be easily confused. The Goosefoot leaves are often subject to a disease which produces a beautiful red color, sometimes intersprinkled with even purplish growths and contractions, while the orachs vary in color especially due to breeding. The garden varieties which Roger Smith described in one of his articles may have yellow or red leaves. Thus the seeds remain as distinguishing features.

If now we return for a minute to the common name of Lamb's Quarters, is it not, after all, surprising that the people in the country who gave two related species the same name hit on the right connection? Not only can both plants be used for a "spinach" early in spring before other greens are available, not only are they actually related to spinach, but they are really closely related to one another. If now we add finally that domestic animals, especially pigs and sheep, like these swift-growing nourishing plants, we may even see the reason for their common name. The name goosefoot is due to the shape of the leaf which looks like the impression of a goose foot in wet soil and which was literally translated into Greek as Chenopodium, which means just this: Goosefoot. Lamb's Quarters on the other hand seems to indicate that the lambs are likely to find this rich and nourishing food to their liking, for there is not much connection otherwise between these plants and the sheep-fold.

The Rooted Parsley

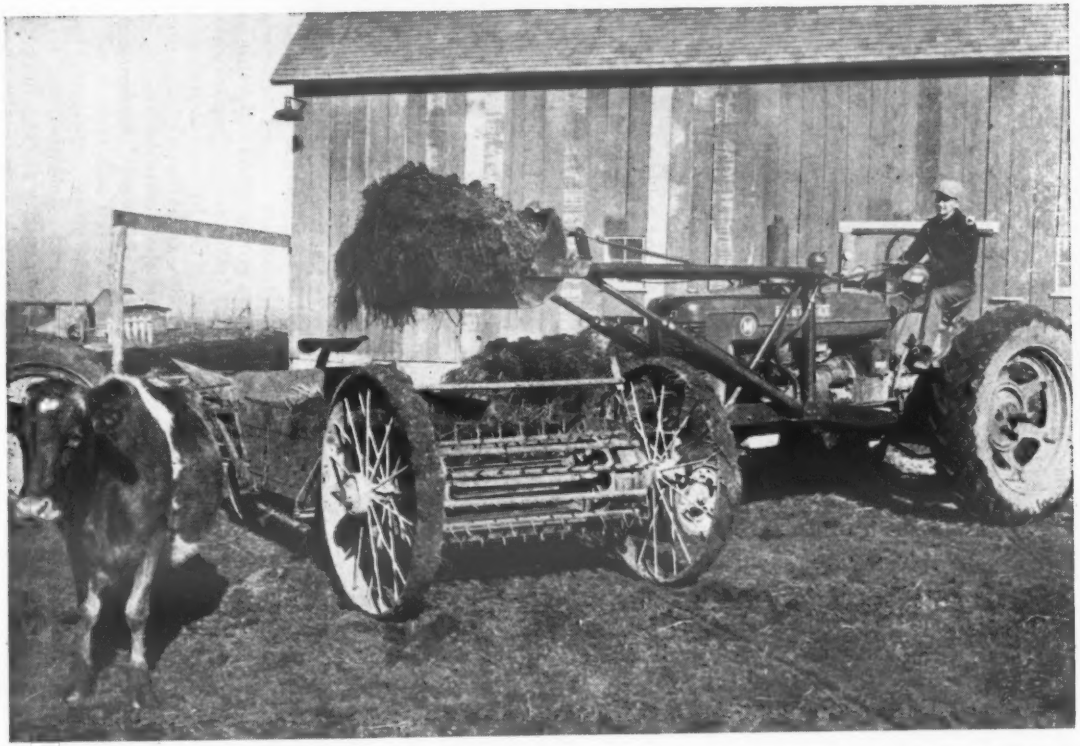
Among the kitchen vegetables of supreme flavor, the parsnip-rooted parsley deserves the attention of every good cook. It is easily grown, can be sown early in the year, and stored over winter in the cellar by embedding the roots in sand. Cooked together with carrots you get a wonderful vegetable plate. Added with carrots and leek to roasts and boiled meats, you get exquisite flavor. At the same time, the refreshing cleansing action of the parsley juice aids digestion and elimination. This variety of parsley has a sweet flavor which far surpasses the curly-leaved parsleys. At the same time, the non-curled leaves of the rooted parsley exceed in fineness of flavor the more decorative, hard leaf tops of the curled variety. Keep this in mind when you order seed for spring sowing.

Soilless Culture

WE have mentioned several times the name of Professor D. R. Hoagland, University of California, a foremost authority on plant nutrition. Among his works is a Circular, jointly written with D. I. Arnon, and entitled *The Water-Culture Method For Growing Plants Without Soil.* (Circular 347, obtainable from the Agricultural Experiment Station in Berkeley, Cal.). Anyone interested in the method should read this booklet at his nearest library before he embarks on the expensive hobby of doing away with the plant's natural medium, the soil.

The booklet by Hoagland and Arnon is strictly scientific. It is very discouraging to the enthusiast who looks for a special formula. It plainly says that the method is uneconomical. It states that much equipment and constant supervision are required to produce success. But how does such a water-culture plant compare with a plant grown in soil? Contrary to general belief you cannot grow more by placing plants in water culture than by growing them in soil. Contrary to magazine propaganda, you need the same conditions of light and temperature for both methods. As for the quality? The authors admit that not all is known about plant nutrition as yet and that we may not know all the minerals that should go into growing healthy plants in solution. When they tested the tomatoes grown in rich fertile soil, in a carefully composed and supervised water culture, and in sand soaked with an artificial solution, they could not find a "significant difference in certain minerals and vitamins." Naturally, they could not test for all the component elements in the plant, and the question whether food plants could or should be grown in cultures is denied by the authors. Growing such plants in remote ocean islands is better than not having any fresh vegetables, but growing them in soil is best.

The authors did not make or report about feeding tests; so we cannot see from their work whether plants from water cultures would produce as healthy animals with the same reproductive power and length of life as plants normally grown. But their Figures clearly show that the plants grown in soil "look" richer and healthier than water-grown plants. But even if all the knowable data were already known, the technique of applying it would be so involved for one not a wizard in plant physiology that the average grower could not but produce a poorer plant if he changed from soil to water. For the plants have become adapted to soils, not to watery solutions. Every plant species has different requirements. In the soil, it can seek out its needs; in a cinder bed or water tank, the experimeter would have to supply its needs. Plants make mistakes in the soil, but growers relying on water culture would make a hundred times more mistakes. In the end, they and their families would undoubtedly suffer. In conclusion, we quote: "Why, it may be asked, do not most of these technical difficulties of the water-culture method arise when plants are grown in soil? Because in a naturally fertile soil, or one which can be made fertile by simple treatment, there occurs an automatic adjustment of many of the factors determining the nutrition of the plant." Consequently —let us make our soils more fertile by giving them proper compost, lime, phosphate rock, dolomite, and treatment by digging, watering, mulching, etc. and leave hydroponics to the experimenter. M.



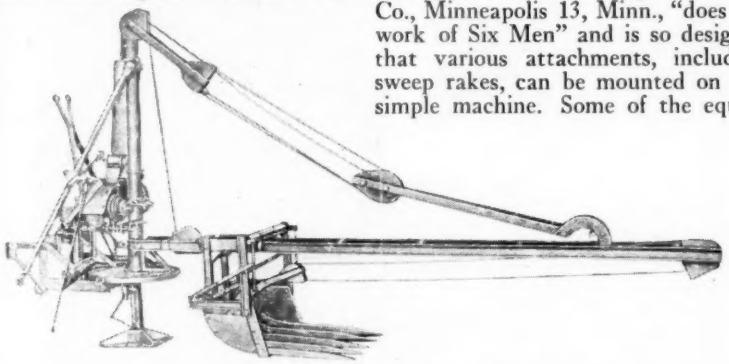
HYDRAULIC FRONT END LOADER

Ottawa Steel Products, Inc., Ottawa, Kans

Manure Loader Equipment In the United States

By H. K. MEYER

IN Sir Albert Howard's papers, reference is often made to the Ransomes and Rapier Muck Shifter which is manufactured in England. In the United States, many such machines exist. Their prices vary from about $150.00 to $500.00 and the equipment is so designed that it can be attached to various tractor models. While the Ransomes and Rapier Muckshifter "is



manoeuvred by a tractor the power take-off of which is used to drive the crane motions", the American machines are in the majority scoops, some of which could also be used for loading straw and other material. The Ransomes and Rapier machine resembles one of those excavating outfits which every city dweller has seen, only that the scooping box is replaced by teeth or forks that grip the manure. The various American machines can be seen in reproductions on the leaflets of the manufacturers. A list of them is attached. Recently, a tractor-mounted Manure Loader was designed by the Agricultural Engineering Department of the South Dakota State College, in Brookings, S. D., and described in their Bulletin 378. It is in principle not different from the equipment available in the market, but shows the need for such machines, which (as John Deere claim for their Manure Loader) do more work than five men pitching by hand. The Super Six Hydra-Lift of the Super Six Sales Co., Minneapolis 13, Minn., "does the work of Six Men" and is so designed that various attachments, including sweep rakes, can be mounted on the simple machine. Some of the equipment, like the John Deere Loader, also shown has cables, other machines do not, and all have been in use long enough to prove their usefulness.

Names of Manufacturers are:

John Deere Manure Loader,

The Hydraulic Farm Hand, Superior Separator Co., 1179 15th Ave., Minneapolis, Minn.

Tractor Power Fork and Shovel, G. and D. Manufacturing Co., Streator, Ill.

Horn-Draulic Loaders, Horn Mfg. Co., Fort Dodge, Iowa.

Super Six Hydro-lift, Super Six Sales Co., Minneapolis, Minn.

Ottawa Farmer, Ottawa Steel Products, Inc., Ottawa, Kansas.

HORN-DRAULIC LOADER

Horn Mfg. Co., Fort Dodge, Iowa.

Possibly some Hayloaders can be utilized too, for instance, the

Haymaster Stacker-Loader, New Method Equipment Co., Indianola, Iowa. This company also manufactures *Workmaster Manure Scoop;* then there are the *Gunco Loaders and Stackers,* made by the Gunning, Inc., Frankfort, Indiana. They are tractor mounted and advertised both for power and speediness.

The Caswell Hydraulic Power Loader is made by the Caswell Manufacturing Co., Cherokee, Iowa. And similar equipment is available through The Coals Co., Ft. Dodge, Iowa, the King-Wyse Mfg. Co., in Elmira, Ohio, and others. Our pictures show machines made by the Ottawa Steel Products Co., Ottawa, Kansas and the Horn Mfg. Co., Fort Dodge, Iowa. Farmers who have to handle great amounts of material for composting as well as large-scale estates and commercial gardeners will be wise in looking into this matter not only as a time and money saving proposition, but mainly in order to benefit themselves and their land by applications of compost.

Horn Mfg. Co., Fort Dodge, Iowa.

HORN-DRAULIC LOADER

Seedlings and Soils

Much discussion has been aroused on the various methods of growing seedlings. It is a commonly known fact that chemical fertilizers injure young seedlings. Way back in 1900, G. H. Hicks of the Department of Agriculture, attributed this damage to the stage between sprouting of seeds below ground and emergence of the young plant above the soil surface. Naturally, a tender young seedling is unable to cope with strong solutions of chemicals. But more recent studies have shown that even the germination of seeds can be stopped or slowed up if the soil is too rich. The pressure relationships inside the seed and in the surrounding soil are responsible for the failure of seeds to germinate in such soils. This is the reason why age-old experience has gone toward the use of sand or sphagnum moss for starting seeds. More recently, several experiments have shown that mixing the sand with good garden soil or *completely finished* compost is sound practice. These substances do not contain strong mineral solutions that could harm seedlings or prevent germination; at the same time, the young plants find nourishment for further growth, which is not the case if the seeds are started in plain sand. If the soil solution contains only seven thousands of one per cent of magnesium sulfate or nine thousands of one per cent of magnesium chloride, wheat seedlings are killed. This shows clearly why highly soluble synthetic fertilizers can be extremely dangerous to plant growth, quite apart from their effect on the microbial population of the soil; it also shows why less quickly available nutrients in organic form are preferable. Many other related data are reported in an article by O. C. Magistad of the U. S. Regional Salinity Laboratory at Riverside, Cal., published in *The Botanical Review,* April 1945.

Poisonous Plants

By ROBERT O. BARLOW

Introduction: Individual Constitutions

IN my younger days when I used to roam all over the globe, I learned of a group of elderly gentlemen in the university town of Erlangen in Franconia. These retired comfortable men were born around the time of the French Revolution, I should say, but kept on living cheerfully. Theirs was an iron constitution. Also, they were in the habit of frequenting a certain well and taking a daily draught from it. It became widely celebrated as a Fountain of Youth and the authorities were induced to inspect the water and its life-giving qualities. They found the well teeming with harmful bacteria, especially the typhoid bacillus, and ordered it closed immediately. The old men had to resort to tap water. They soon died. Of course, their death was bound to occur sooner or later. All I mean to convey is this: Gradually these men had become, if they were not born so, immune to the teeming flora that would or should have spelled their death according to the rules.

Years later, in fact, only some fifteen or twenty years ago, when visiting with a great-niece in Ireland, I was struck at the young mother's outfit. Before she prepared something for her baby, she put on a nurse's white garment, covered her lovely hair with a cap, and cooked her spoons in boiling water. Naturally I could not convince her that too much hygiene was unsound and that little Maggie would probably come down with all the illnesses and ailments in creation because she was not permitted to develop gradually, what is generally called, immunities. I held out for taxing the young systems, keeping up taxing them until nothing but a thunderbolt could harm them any more. (Thunderbolts, by the way, are not very dangerous either, come to think of it.)

Modern medical practice seems to have advanced in optimism over older practice such as we knew, let's say, back in the eighties. We more or less accepted the fact that people were and always would be, quite normally, sick if they had not healthy constitutions inherited from birth. Nowadays, it looks as though everyone should, could, and actually would attain a certain norm of well-being, if only some preparation were shot into him to make him immune, if another preparation were given him to cure a couple of deficiencies, and if he used the proper diet to fondle his individual allergy. It looks as if "modern science" had the answer: Everyone can become a perfect specimen. We did not think so then and I do not think so now. On the whole, many of the younger generation are less substantially nour-

Wide interest shown in Mr. Barlow's *Modern Herbal* prompted us to ask the author to make the entire material available at once and in book form. Mr. Barlow consented and we will, before long, publish as an issue in THE GARDENER'S BOOK CLUB, a carefully illustrated work on dozens of herbs growable in the garden and useful in kitchen and medicine chest. In order to keep Mr. Barlow's stimulating studies before the readers of Organic Gardening, we have, at the same time, prevailed upon the author to contribute an extended series on Poisonous Plants. The first installment follows.

ished now even though "balanced diets" are served in the smallest eating places. In drugstore eating, you get a leaf of lettuce every time and think with pleasure that you might be taking in a day's ration of vitamins as you sip your malted milk and eat your "enriched" bread with an olive on the side. We did not know of vitamins, but apparently got them when we ate our substantial unbalanced meals according to the seasons. Most of our food was, of course, also naturally grown in those days, with less emphasis on artificial fertilizers.

Suppose you investigate an allergy, which is, in all events, an individual poisoning! The word *allergy* itself describes a rather complex set of unknown circumstances. If much were known, people would not have hay fever the way they do, and if all the proclaimed discoveries worked out, people would get over those allergies more frequently. Is it not true that "Science" has made much of the general vague term "allergy" because we do not know what happens when Mrs. Spratt gets the sniffles and begins to suffer suddenly while her husband smokes his pipe in peace? What distinguishes Mr. Spratt from Mrs. Spratt? What goes on in their respective bodies? How do their biochemical reactions differ to an extent of so much suffering and such perpetually swollen eyes? Medical Science, which has replaced in popular parlance our old-fashioned medical art, cannot even tell you why Mrs. Spratt lays on fat, while her husband remains lean; nor can this science tell you how the two systems differ in point of flatulence. One develops gas, the other rarely does; one eliminates three times a day, the other once. What is behind all of this? Every student can tell you that this falls under Metabolism.

When we come to think about "Poisons" we must keep the foregoing remarks constantly in mind. A snail can be seen feasting on poisonous toadstools. To him, these mushrooms are delicious food plants, while a little bit of arsenic kills him readily, if the books on Insect Pests know what they are talking about. After all, it used to be said that certain sprays killed insects, and now we find that the insects survived cheerfully and that some of the sprays are going out. Who killed what?

If there isn't already an old proverb, there ought to be one, and I think someone thought of it before I did: "One man's fish is another man's poison." A poison is as much a generality as a food. So here we are: Foods and Poisons are relative terms. To ram this point home, I'd like to start right off with the well-known Fava bean.

1. FAVA BEAN

"Fava beans are cultivated extensively in New York, New Jersey, Illinois, and California. They are a staple article of diet and are imported as canned food from Italy," says Professor G. M. Dack, Ph. D., M. D. (University of Chicago bacteriologist) in *Food Poisoning* (U. of Chicago Press, 1944, p 27.) "Well-known" I said because I had eaten them myself. But none of three standard gardening encyclopedias I consulted gave any information. The Fava Bean, sometimes sold as Lima Pea, frequently called Broad Bean, Horse Bean, Windsor Bean, Scotch Bean, English Dwarf Bean, and even Mazagan Bean, is a vetch, *Vicia faba.* It has great variability, and two strains, different in seed size, were bred in Europe, the smaller one being used almost exclusively for horse and hog feeding. This vetch carries the classical name of *faba,* which means in Latin *bean,* and which may well be the vegetable which the disciples of Pythagoras refused to eat. In this country it is frequently eaten by Italians, many of whom have developed a taste for it and are not adversely affected by it. In England it used to be common enough: the mature seeds are eaten in soup form. In the Alsace, these beans are ground and the flour, called Castor Meal, is mixed with wheat flour for baking. In

Hannover, Westphalia, and on the Nether Rhine, the seeds are cooked with bacon and relished as so-called "Thick beans".

The data collected by Professor Dack under the heading of *Favism* indicate that, by 1937, there were 1,211 reports of cases of a disease caused by the inhalation of pollen or the eating of raw or cooked beans. Poisoning is more frequent after the eating of fresh green beans and with people who are not habitual consumers. Nausea, vomiting, chill, pallor, and pain in the lumbar region are followed by high fever. Within five to thirty hours hemoglobinuria occurs, followed by icterus or jaundice. The urine is black, dark brown or bloody. Hutton is quoted as attributing the poisoning to an allergy and he can make this not entirely implausible by showing that only twenty per cent of the cases occur in families that seem predisposed to severe attacks after consumption of such beans.

The practical conclusion is, of course, to eat these beans in the dried state, in which case, from Dack's data, not much harm can be expected. Still I have myself eaten those beans raw as well as cooked, after drying, and relished them in both instances. J. I. Rodale acquainted me with a letter received from a reader of *Organic Gardening*, Mrs. Le Mon of Los Angeles, Cal., in which we read: "In March my husband went out and told me there were some big enough to eat. I had seen them eaten only like lima beans, but these snapped so nicely that I decided to try them. They have a sort of nutty flavor. For two months we had green beans when there weren't any green beans in the market. We like an onion and a couple of stalks of celery cut in with them and a slice or two of bacon." When she gave some to her neighbor, who cooked the beans without the pod, the reaction was unfavorable. Upon further investigation it appeared that the neighbor had cooked the beans in a pot with some enamel chipped off. The beans were tough and had turned black. Mrs. Le Mon discovered that even after washing the beans in a defective pan the water turned purple and discolored the bean. Quite scientifically she concludes: "I therefore supposed that some kind of acid was in the fava bean."

So far, the data are contradictory. After all, this bean was known to the Chinese, Babylonians and Egyptians The latter did not cherish it, but considered it as impure, as we learn from Herodotus. From there, Pythagoras probably received his aversion. Just the same, Schweinfurth found several seeds in tombs of the XII Dynasty. In Europe seeds have been found in remainders of stone age habitations. Poisoning by beans like the one described by Dack as Favism was reported from Europe as *Lathyrismus* and was then attributed to the presence of cyanic acid.

We have thus—with an "acid"—come across something that might explain the discoloration in the chipped-off pans and pots, but which nevertheless wars against the hypothesis of an allergy. Let us therefore look in passing at the question of hydrocyanic acid. It may help us along a bit.

Every year, there appear reports in the United States that cattle or other livestock had died as a result of cyanic poisoning, after eating sorghums, Johnson grass, or some other forage crop. It is, for instance, well known that the wild lima bean is a legume that develops under certain temperature, light, and growth conditions a glycoside which contains or rather produces hydrocyanic acid. This is said to be the same amygdalin which you can taste in the pits of cherries, plums, apricots, and which is used as a flavoring in bitter almonds. In most cultivated beans it has been bred away, but it is present in wild legumes. When the animals take up some feed which contains such substance, especially when they take it upon an empty stomach, they soon show nervousness and cramps, the lips become blueish, and death may result if help is not immediately administered by suitable injections. These symptoms differ con-

siderably from the ones described by Dack under Favism.

Is Lathyrismus then something different from Favism? You have probably noticed that beans when put in cold water sometimes produce bubbles which look like soap bubbles. Offhand, you might think that it is protein matter but there may be another glycoside, saponin, involved. Saponin, a froth-producing substance, used to be added to effervescent drinks. But it was discovered that saponin is hemolytic, that it dissolves red blood corpuscles which is definitely the case in Dack's Favism. Perhaps, there are strains of Fava beans that produce considerable amounts of saponin? Undoubtedly, whether this is the case or not, there are strains of people who can resist greater amounts of this hemolytic agent, whatever its nature, than can those who come down with serious diseases after ingesting fava beans. To speak of "immunity" is a rather superficial term, to blame an "allergy" is no less vague. In the system that can resist the same hemolytic substance that throws another individual into jaundice, a different series of bio-chemical processes takes place. The hundreds of thousands who have eaten fava beans without punishment must differ constitutionally in one or several specific reactions from the 1,211 people who came down with Favism. Unfortunately, both for the reputation of "SCIENCE" and the welfare of the afflicted, our belief in generalities, our description of a complexity of symptoms, and ultimate finding of a nice word does not bring us one step closer to the discovery of these individual constitutions which manage to handle fava beans efficiently, nor does the designation "allergy" show us why some others can not digest the same food without being poisoned. We are one step further now; we realize that beans contain hemolytic substances that may be poisonous, but we do not know why they are poisonous to some and not to others.

What practical advice should I now add? Obviously enough, the record of the fava bean is so old and comprehensive, the liking for it so widespread that you cannot call this vetch a universal poison, such as will be discussed in connection with other poisonous plants. You may eat these beans raw and never get ill, but you are taking a certain chance. If you like risks, if you feel that you must train your body to absorb everything, you had, just the same, better eat something else before you ingest fava beans, so that you do not take them on an empty stomach and so that you get accustomed to them little by little. If you eat the dried seeds, you are naturally much safer. But since there are so many other delicious beans and peas, since especially the lentils are delicate in flavor and above reproach as to health value, you really are not so hard up if you avoid fava beans. It is, at all events, the safer course. Old Cleopatra, the one which everyone knows from the plays of Shakespeare and Bernard Shaw, is said to have acquired an almost universal immunity to all poisons—those were the days when the cook had to serve the meal in person and take a spoonful before the scrutinizing eye of the suspicious ruler whom his more or less beloved entourage and subjects might try to poison —but unless you are in particular need for an immunity against favism or lathyrismus you may well disregard Cleopatra's example. The Indian mothers fed their babies some poison ivy in order to make them safe from poisoning, modern society insists on various inoculations, which are to do away with pox and other contagious diseases, but Organic Gardeners have so many delicious vegetables and fruits that they can omit the dubious ones without sacrificing anything.

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The Health Page

WHEN a gardener takes the trouble to grow first-rate vegetables with compost, he or his wife must also know how to preserve the vital elements in them when these vegetables come to the table. It is understood that the modern gardener knows by now that fresh, raw vegetables are best, but some vegetables can, of course, not be eaten raw, especially during winter. Just the same, there are many ways of shredding roots and fixing them in a salad. This brings to mind the question of oil for dressing.

—o—

Some oils are indigestible and have therefore been advocated as lubricants, as if we were gasoline engines. I am speaking of mineral oils. The Department of Agriculture has come out strongly against them, because they rob the body of some essential vitamins. A further result is that the body can then not utilize calcium and phosphorus either. The unwise cooks who use mineral oil doom their families and themselves to weak bones, bad teeth, and general deficiencies.

—o—

When are vegetables richest in vitamins, let us say, vitamin C? That depends on several circumstances, but the work of Dr. B. L. Wade of the Bureau of Plant Industry will give us some valuable information.

At Charleston, S. C., snap beans and cabbage were grown on many different plots, samples from commercial growers were also taken. Then the crops were analysed throughout the year. The results were given before a symposium of agricultural workers in Memphis, Tennessee, in February 1942, but have been somewhat over-

looked by the wider public, though they are highly important.

It was found, for example, that the vitamin C content of snap beans was highest in the coarse, fibrous varieties; that the first crop in spring was richer than the following crops. In fact, the vitamin C content declined steadily. But in fall, it was the opposite. The first crop was low, the fourth picking high.

It was noted that cabbages varied more than beans, not only in one year, but through the years. The variety Volga 1 had 75 parts Vitamin C in 100,000 during 1940, and only 47 during 1941, whereas the variety Volga 4, which had a much lower percentage in 1940, surpassed Volga 1 in 1941. The most significant aspect, as far as the organic Gardener is concerned, was this: Two commercial varieties, taken from commercial sources were at the bottom of the list in 1940 and close to the lowest in 1941.

—o—

Government Scientists are constantly working for better vitamin and food value content of vegetables and fruits. But even so, every organic gardener can improve on their work. Professor Lord of Urbana, Illinois, recently stated that well cared for, vigorous trees bear apples with more sugar than trees less well cared for. And as a reference to a new book on *Plant Growth* by Professor Yocum in this issue shows, the best cared for trees are trees growing in a soil rich in organic matter. The compost gardener does get better fruit and vegetables and knows it; but it is a fine thing too to see more and more scientists discover how right we have been. D. C.

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3 lb. "Ready to eat" Nu-Meal cereal
4 lb. roasted (Flint) corn meal
5 lb. plain (Flint) corn meal
6 lb. plain (yellow dent) corn meal
3 lb. roasted Edible Soybeans
8 lb. raw Edible Soybeans
7 lb. Soybeans finely ground
8 lb. Wheat finely ground
8 lb. Rye finely ground
2 lb. Sunflower seed
1 lb. Sunflower seed shelled
1 lb. Sunflower seed finely ground

SMALL ORDERS WILL BE ACCEPTED

Express and parcel post charges paid. Add 5 cents per lb. for all points west of the Mississippi.

Above items grown without strong chemical fertilizers or poison sprays, and sent from farms where grown.

NU-MEAL MILLS
Apple Creek, Ohio

What Does It Mean? Hemerocallis

If you did not know the plant, but just Greek, you could figure out the meaning: *Hemero* means *day, callis* means *beauty*. You know the first word from *ephemeral*, which signifies shortlived, passing things, whereas the second part is also known from *Calliopsis*, which means Beauty-face, the same as *Calliope*, the Muse of poetry, to whom ancient singers addressed their prayer for inspiration. Short-lived beauty, Day-beauty. What is the name of this flower in English? It is, of course, our Day-lily. You will be interested in knowing that the scientific name *Hemerocallis* was given it by Linnaeus, far back in the 18th century, when so many of our plants were first classified and named. But *Calliopsis* was named *Coreopsis* by Linnaeus, because he was reminded by its seeds of the shape of a bug. Our gardeners have preferred to use the more attractive name Beauty-face instead of Bugface.

Soil and Health

By H. C. Haas

"FIGHT CANCER WITH KNOWLEDGE"

THE sad news came to me recently that an esteemed neighbor, a mother of two small children, probably in her early forties and wife to a worthy citizen, was expected to die within a few days or weeks of cancer, in great suffering, this consuming disease affecting much of the bone and other tissue in several widely separated parts of her body. Every last known resource of the doctors having failed, she had been sent home to waste away. Her suffering was being eased with opiates but the pain of parting forever with her family and the nightmares induced by the drugs were there. Let us cherish the hope that this news has been exaggerated and that something can be done.

This case is only one of a great many thousands. Indeed cancer in this country is definitely a greater killer than the war. Those killed by cancer in America in 1943 were 163,000, women in the majority. Three years ago this mother had one breast removed, being told then that her chances of not having a recurrence of cancer were one in four. Breast removal is a very common cancer operation.

"Fight Cancer With Knowledge" we are told by the American Cancer Society. This unfortunate woman, being well educated, having intelligence and frequent contact with informed people, reading "magazines" of information surely had that most useful knowledge imparted by the society, which was the importance of seeing a doctor when the first trace of the dread malady made itself manifest.

Information that is not exaggerated and seems all too true is that cancer in this country has been steadily increasing, never showing a decrease, cancer deaths for the U. S. rising from 79 per 100,000 population in 1913 to 122.1 per 100,000 in 1942. For New York State, where much of the country's urban population is concentrated, (New York having more than one tenth of the total U. S. population, almost twice as much as Illinois, which ranks third among the States, New York first), the cancer death rate has been much higher—rising from 100.4 per 100,000 in 1920 to 156.1 in 1941, with no decrease in any year. The New York State rate was about twenty per cent higher than the U. S. rate in 1920 and about thirty per cent higher in 1941. The Illinois rate runs intermediate between the New York and U. S. rates, about ten per cent higher than the U. S. in 1925 and twenty per cent in 1941. Illinois ranks between New York and the whole country in "urbanity" and cancer prevalence and increase. The rates for Pennsylvania, ranking second in population, are not in the 1943 World Almanac. The New York City death rate from cancer in the five boroughs in 1940 was 37.5 per cent higher than the rate for the U. S.

Clearly cancer is an urban disease. Only heart disease shows a similar high increase and high prevalence. A similar analysis of the figures for that would be illuminating. Tuberculosis and pneumonia over the periods shown above have shown a big decrease, kidney disease has been about stationary, diphtheria has almost disappeared. The germ diseases are being successfully whipped out of existence with germ killers, antitoxins and steril-

ization, while the so-called "degenerative" diseases, not all listed here, those not traced to any germ but arising from abnormal processes in any or all parts of the body and of more or less mysterious origin or cause, bringing about functional derangement of vital organs, glands, the circulatory system and the nerve system, are either not decreasing or threaten with their uncontrolled growth in toll of death cases to strike close to home in every family and get us all, like a rising flood, unless we can discover and remove the causes.

Some causes for cancer that have been much mentioned in the past have been chronic inflammation resulting from incessant or recurrent irritation, parasites, much exposure to tar and alcoholism. Sulphur, from coal gas, coal soot or from chimney gases arising from coal fires, usually breathed in through the nose and absorbed in lungs and ear passages, has been put forth in quite convincing manner as a highly contributory cause by Dr. C. E. Greene in his book "The Cancer Problem", to which Mr. Rodale gave much space in the August 1944 issue of Organic Gardening. Chimney sweeps in England, constantly in contact with sulphur in coal soot, have had more cancer cases per hundred of their number than any other workers. The higher prevalence of cancer in urban areas, shown above, where chimney smoke so generally pollutes the air, strengthens Dr. Greene's contention, as does also a bit of the writer's own experience, described in a letter to Mr. Rodale, commenting on Dr. Greene's book. Quoting verbatim from the letter:—

"I have the August 1944 Organic Gardening. In bringing out the connection between sulphur and cancer I think you have something.

I have known for years the "X" family, living not far from me. Mr. "X" worked for the Westchester Lighting Company and was the best man they had for the work he was doing—so good that they enlarged his territory. He did nothing else but looking for gas leaks. All day he would walk around, following all the buried gas mains and branches in his territory, carrying what looked like a bamboo cane but what was really a hollow tube made of bamboo. He could detect escaping gas where no one else could. Illuminating gas in Westchester county is distributed at high pressure, higher than in New York city which adjoins, because the distances are greater in the suburbs and the higher pressure permits the use of smaller pipe. The higher pressure forces more leaks. Escaping gas kills plant life. I have seen large brown patches in lawns where leaks have occurred. Mr. "X" used his bamboo tube to verify small leaks, holding one end to the ground and the other to his nose. He had plenty to do.

Mr. "X" died of cancer and the growth was in one of his ears. The ear is connected with the nose through ear passages. Illuminating gas contains sulphur. He was a man whose face and hands acquired the color and texture commonly found on men always outdoors in cold climate. Being outdoors all winter all day, it was uncomfortable for him to enter a heated dwelling.

The thought struck me that here is a man who should be healthy, outdoors all day, enjoying physical exercise walking all the while, never using a car; I was surprised to see him in the bus one day going to the doctor with much emaciated appearance. That was not long before he died. He told me what he had and I wondered. This article of yours is definitely the explanation.

In Westchester county nearly all people use gas for cooking. The usual kitchen gas stove has four burners on top and another in the oven. The products of combustion usually go nowhere but right into the kitchen. With the common use of the "pushbutton" lighter some unburned gas goes there too, a serious matter if the winter ventilation is poor. Unburned gas having affected Mr. "X", will it and the burned gas, also containing sulphur, some of it oxidized perhaps, affect housewives? Increase in cancer and particularly among women has kept

pace with the increasing use of gas for cooking. Gas stoves are known to affect house plants badly."

So much for sulphur as a cause for cancer. There is another cause not yet generally known or recognized, which as some of us think, is "looming big on the horizon". It is a cause that appears to affect urban population more than rural, just as chimney smoke. Possibly it overshadows all other causes. Dr. Greene mentions it but does not enlarge on it as he does on sulphur. It is quite possible that what we take into our stomachs through our mouths might affect us as seriously as that getting into our lungs and ears through our noses. America's population, once mostly rural has become mostly urban, and our change of habitat has changed our food as well as making impure the air we breathe. The food change seems inseparable and unescapable with the crowding of the population into cities.

We have quantity feeding and quantity production of food, assembly line methods and combine harvesters on milesquare fields instead of the primitive methods which fed humanity and all other life in nature's way, the way that has kept man on earth for over a million years. Nature's way, so often mentioned on these pages, is an organic return to the soil for all that is taken from it. The cities take and take and send back nothing organic. The farmer puts back what he can but he can not get the organic equivalent of all that goes to the cities on the freight trains and trucks. He gets money with which he buys synthetic chemical substitutes for nature's humus. Good humus can be made in three months and readers of Organic Gardening are making it in increasing numbers. The "Friends of the Land" are stopping frightful loss of humus by erosion and bringing back as much as possible the hitherto disappearing animal life which can put back on the soil that which human beings do not put back. This small life, birds, toads and the like, can destroy the insect pests that must be destroyed with poisons on the milesquare field harvested with the combine, which cannot provide a habitat for the small life. It cannot be a habitat for earthworms either, because the poison sprays get them. The trend is toward "sterile" farming, or may we call it "azoic" farming, azoic meaning without life. It is applied to the rocks unearthed by geologists thought to be formed before the earth had life. The growth of flowers and some food plants by hydroponics apparently can be "sterile" or "azoic", the only life present being the plant or plants being grown.

Nature, in a beginner's way, produced the first plant life with nothing but inorganic chemical substance and water in that early "azoic" period when there was no humus on the earth. It was difficult because there was no Liebig to mix just the right chemicals in best proportions. Such plant life could not have the complexity of structure and composition necessary to adequately nourish that supreme achievement of evolution called man, which was to come a few billion years later. Normal food for man can be produced only with the cooperation of that immense world of living creatures living unseen in those few inches or feet of soil depth on which all animals tread, creatures minute in size but numerous enough to bulk *normally* about as much as all animals, birds and insects above the ground. This immense soil population, living in the dark and little known to us because they do not show in moving pictures, have also slowly developed to a high degree of complexity during those same billions of years.

The writer, having enlarged on a probable cause for cancer and other degenerative diseases afflicting people most where the so-called civilization advance is greatest, will now attempt to cite some proofs that have come to his notice. Let the search continue. As other Organic Gardening readers he is convinced that all that other life that has cooperated with man, since evolution began for the continued existence of all, should not now be rendered extinct, useless and void with poisons and chemicals. The earth-

worms, the soil bacteria, the toads, the fungi, the bees, the birds, even the termites which make humus out of dead wood only, have worked for us without pay for millions of years, getting no housing, no silks or satins, no artificial heat, and now we are about ready to exterminate them all with DDT and similar means. Watch the cancer rate go up! We cannot kill all this life without killing ourselves.

Significant is the fact that in America more than in other countries where the "standard of living" is lower there has been a rapidly growing inability of women to feed their infants normally. Mother's milk is non-existent or deficient in quality. We suspect that there is many a young mother so out of touch with history as not to know or care that the human female breast was made to feed infants and that human beings are classed with the mammals. Substitute milk from cows, claimed to be rich enough with the addition of vitamin B and other fixings (to make formulas, many in kind and none just right) must be pasteurized before it can be used or too many babies will die. And it is in the idle and impotent breasts that cancer often starts. Race suicide, rampant here, is non-existent in other countries and that is a subject too large for this article. Foreign mothers, closer to that prehistoric million year normalcy, raise big families without knowledge, without benefit of big hospitals, skillful doctors, highly efficient nurses and all the sterilization. Mothers everywhere of long ago did the same. Normalcy has departed from us in greatest ratio where the so-called standard of living is highest. A multiplicity of bright baubles, bright only when new, we worship, while we and the soil that feeds us both slowly vanish.

A very significant fact culled from the writer's past observations and mentioned previously in this magazine in the article "Fish Food", appearing in three monthly installments starting December 1944, is the experience of the American fish hatcheries for fresh water fish. When the fish were fed land produced food they developed cancer in epidemic proportions, many of the tumors being half or a quarter as large as the fish and easily discovered. When the food in a certain hatchery where the disease was endemic for a number of years was changed to chopped sea fish the cancer disappeared. The sea fish cut up for this food had never eaten anything that had been grown with the aid of synthetic chemical substitutes for humus. The farm animals whose flesh had been eaten by the fish which were the victims of cancer were fed on the products of good American soil—at least we have all felt quite secure in the thought that it has been the best on earth—aren't the best fertilizers on earth used on it? And aren't we now getting ready to feed much of Europe from the same soil? It is too bad for Europeans that we are and too bad for us too, because that will spread cancer. Our attitude toward Europe and all other lands is beneficent. We truly hope that Europe will consider us as true Christians, not all of us worshipping Christ perhaps but all adopting his teachings and philosophy.

The California Institute of Technology of Pasadena is said to have developed with grand technique a new food, wonderfully palatable, very easily cooked and highly nutritious, and just the thing for feeding starving Europe or starving Japan. We need not be so much concerned with the shipping out of the country of so much of that which belongs to our own soil for our own enrichment and enjoyment. What we send out is a negligible fraction of what we destroy and lose ourselves forever by burning and by casting into the ocean to the fish. What we do need to be concerned about is that much of the soy bean crop used for this new food is almost certain to be grown in soil fed with chemical fertilizers, regardless of what Cal. Tech. can do to prevent it. The chemical fertilizer industry has grown immensely and its influence on the soy growers will no doubt be great particularly as the growers cannot get from the cities their organic waste for nature's kind of soil enrichment and think they are

compelled to use the man-made substitute.

The reader is referred to the pamphlet "Diseases of Food Animals" by Owen S. Parrett, M. D., printed in 1939 by the Southern Publishing Association of Nashville, Tennessee. If that pamphlet is not available in most libraries there should be another printing or another up-to-date survey. It shows the high prevalence of cancer in chickens and cattle. Some of this is being alleviated by feeding chopped sea food to farm animals. Dr. Parrett, getting an astounding array of facts attesting to the prevalence of cancer in the flesh food from the farms and cattle ranges that we eat, and he not knowing the cause, wanted us to abstain from the eating of all meat! We might just as well abstain from the eating of all vegetables, fruits and grains and all the milk and eggs produced on the same soil. We make up part of the food deficiency with vitamin pills. Are we going to send vitamins to Europe with the food?

Vitamins also are a man-made product, and are merely a substitute for that which all food and all organic matter should contain in abundance and did contain before civilization's advance. They are a substitute to replace impairment just as truly as eye glasses and hearing aids, also most wonderfully developed in recent years. But the normal human seeing equipment and the hearing equipment, the eyes and ears and their hidden accessories, all occupy very small space in the head, weigh next to nothing, last normally seventy years with no repairs, no replacement, no money spent, while the eye glasses and the bulky hearing aids need frequent complete replacement at expense beyond the means of the average human inhabitant on this earth.

Dr. Parrett mentioned a large volume "Carcinoma of the Thyroid in the Salmonoid Fishes" by Harvey R. Gaylord, M. D. and Millard C. Marsh. which is *Bulletin of the Bureau of Fisheries* XXXII, (1912), (Document No. 790, U. S. Government Printing Office, April 22, 1914).

Those who wish to escape a potent cause for cancer in the United States are urged to eat very largely of sea food, however bony, smelly and fishy it may seem to those not used to it, until they can be assured that the land food they eat is grown in soil like that which covered America a couple of generations ago, rich in organic matter and devoid of poisons.

"Fight Cancer with Knowledge." The knowledge gained in the way herein indicated will help us in the fight against other disease and strengthen for us the admiration and cooperation of the rest of humanity. The world looks to us for leadership. It is only a wise leadership that will prevent that next war and the further use of atomic bombs, which, like cancer, are directed against the cities.

The Red Light

"There is something unsound and menacing at the roots of our world. The riches of the earth, the coal, metal and oil, have been exploited until we can foresee the danger level of exhaustion; we can indeed hardly afford to squander them in future wars. The soil that provides us with our harvests may soon be carried away by the winds if we continue to rob it of real values, and replace them only by chemicals."

—From "Waltzing Volcano," a new book by Francis Weiss.—*Compost Magazine,* New Zealand.

Human Wastes and the Dropping Pit

By JOSEPH A. GOLDING

IN the November number of Organic Gardening I noticed three articles dealing with the disposition of raw manures. To this I should like to add another bit of information. The article on the dangers of uncomposted human wastes, forcefully brought home by Mrs. Hill in her description of Southern Chinese practice, confirms my own experiences and informations. When I visited Southern China, a good many years ago, I was struck by the unsanitary conditions of the country—people lying on the roadsides in misery, covered with boils, attacked by flies, and spreading their diseases to others. When later, I studied farming on a more scientific scale, I found frequent references in the literature to animals refusing to eat the grass grown on spots where unrotted raw manure piles had lain; despite the lush growth of grasses, the animals left these rich nitrogenous growths alone. Had it been balanced compost, the result might have been different. The article by Dr. Amon-Wilkins supports this view splendidly, and the description of J. I. Rodale's method of composting chicken droppings right below the roosts showed a sensible and practical way out. When the construction of such a dropping pit would be inadvisable because of the possible costs involved, there is still the less attractive, but feasible alternative of using peat moss and keeping it wetted down. This method, which I have seen in use in many commercial places, is expensive, but also produces a rather balanced mixture of animal and plant matters, eliminating at the same time all bad odors, such as can not be kept down when dry litter is used.

But what is the farmer to do who has an outside privy? True, these installations are becoming scarcer, but nevertheless, there are plenty of old farms, small farms, farms without running water, in which the oldfashioned outhouse is a necessity. When such a structure is present, there will be human wastes to be disposed of. What is the farmer to do?

The raw material in these privies is too rich and unbalanced for direct application. In fact, since there must be a pit, the material rarely decays adequately because moisture seeps in. As a result, the material is a loamy mass of penetrating odor that cannot be applied to the garden directly, because it would cause poor, over-stimulated crops, because it would produce vegetative growth rather than the desirable balanced growth of root and seed crops, and finally because disease producing germs might be transferred readily to the leafy vegetables. Thus no raw food could be eaten safely. In the older days, this group of troubles was overcome by applying the contents to the field when snow lay on them. The winter colds broke up the material, caused death to the living organisms, and the spring thaws carried the material down in the ground or away in the ditch. Liquid manures are often applied directly to the meadows in winter and spread by various devices without harmful effects. But what is the gardener to do?

Perhaps it may not be amiss for me to tell what I did when I purchased a small Pennsylvania farm, such as Mr. Evans seems to have described in a recent issue describing his garden. There was an oldfashioned privy right next to the garden. First, I erected my compost heap close to it. Second, I decided to use the outhouse pit itself as a composting pit similar to the one described by J. I. Rodale as used for his chickens. I experimented a little at first and came to the conclusion

that no difficulties could arise if proper safeguards were employed. The best and most important test is the nose test. When there are no odors, then there is no waste. When there is no waste, then there is a balanced compost.

I cleaned out the privy and used the material in my compost heap. Then I filled the pit with straw and sods and weeds, rather liberally, I must say. Almost completely full. It did not take more than a few days when the material had settled down. There was absolutely no odor whatsoever. When an odor developed, I added some more green matter and occasionally I put a bucket of earth down. After two and a half months, I emptied the pit. The material was of an even dark green color, some strawy material still recognized, but the thickest weed stalks practically decayed. Only, I decided to be on the safe side. Thus, instead of applying the material to the land, I applied it on a new compost heap. You should have seen how quickly this heap heated up! This is a sure sign that the proper balance prevailed between carbon material, such as occurs in straw and other plant tissue, and nitrogen, such as occurs in animal and human wastes.

Following recommendations in bulletins, I had at one stage applied some hydrated lime. Much has been said in older literature about lime. It should not be applied at the same time as manure. In recent books, this theory has been somewhat debunked. But I must confess that, as soon as I put a few trowels of hydrated lime down the privy, the release of ammonia gas became immediately noticeable. Had I used agricultural lime, that is, ground limestone, this might not have happened; but I had this material not available at the time, and since I was not interested in sending the nitrogen out in the form of ammonia odors, but rather in saving it for the growing crops, I did away with lime in the privy pit, but I applied a little of it, just a fine sprinkling, over the layers of earth that I used in the compost heap. Needless to say, even the compost heap had no odors to speak of except during the time of construction. After the heap was built, I covered it with earth. This cut all odors off.

I was somewhat struck with the experiment Dr. Meyer reported on Sesame seed. There occurs a passage in which he says that he had used the topsoil from a bed for making compost. But when I thought more about this, I decided that this practice could not hurt in the end: The soil remains right there and will return to the garden. In the meantime, while it is necessary to add soil rich in all bacteria to the compost heap, while therefore top soil must be used for proper results, a little spot of subsoil is always handy for experiments with different plants. Considering the many deep-rooted vegetables which we grow, it would appear that practically all of them reach down to the lower soil strata for part of their nutriments. Everyone knows how hard it is to dig up a burdock or a chicory plant, both of which send their roots far below ground. In considering these natural phenomena, I would therefore say that you should use good soil for the compost, for the dropping pit or the composting privy and get complete success while giving yourself the pleasure of experimenting with a spot of subsoil next to your compost heap.

I had not intended to write about these matters, since I am fully aware of the policy of Organic Gardening not to recommend the use of human wastes while so many other materials are available. But on the other hand, there are conditions and farms where the human wastes are present and must be disposed of. The method described above, which parallels the Chicken Dropping Pit method, is a good solution: First, compost the material in the privy itself. Second, use the product not on the land but recompost it a second time in the compost heap. If you do this, you not only get more compost, but you also have no odors. For you can completely utilize the nitrogenous materials that would, under any other system, be allowed to go out into the air, be lost

to your crops and become offensive to our noses. You will soon find that dried material is quite suitable for the Privy Pit which always tends to be on the moist side. If you use green material exclusively, you will get too wet a substance for complete decay, since the Privy Pit cannot possibly have much air. Thus, by using this material once again in the compost heap above ground, you really combine all possible methods of disposal and preservation of fertility. You get completely broken down compost, with the rich odor of fungi, that is characteristic of the final stage of composting. And you apply nothing to the soil that you need be afraid of.

Garden Calendar — January

North Temperate Zone: Watch out for heavy snow loading down shrubs; you can shake it off and save them from the burden. Often a bamboo rake is handy.

Order your seeds early and try a few new varieties. When you want new introductions or All-American selections, be doubly sure to buy before the small first year's supply is sold out.

If tender bulbs and roots are stored away, watch out for mice and shriveling. If they shrivel, spray them with water.

Watch out for mice in general—set traps in cold frames, around hardy bulbs, such as tulips, and near mulched shrubs, roses, etc.

Feed the birds. Look after fruit trees and see that they are guarded against rabbits.

You can begin planting seeds indoors, especially pansy, snapdragon, delphinium, petunia, clarkia, begonia. Try a new strain or variety and think of the beauty of your garden now—some of the giant delphiniums may surprise you and your neighbors. You can even give them a freezing outside, the same with Monkshood which is a slow germinating seed.

You can move trees with frozen balls. If you want to dig, spread manure in a circle around to soften ground. But it is better to wait until spring, then to dig a trench round the bush and cut off the roots, to fill the trench again, and then to move the tree next fall.

Do not apply any plant food during the winter months; house plants get root burn very easily under indoor conditions.

Southern Gardens: Think of the February frosts, but plant the hardy crops, root crops, lettuce, spinach, and cabbages.

If you want a flower garden to excel, now is the time to put out almost all the seeds and plants to give them an early start.

Old Rule: Thunder in January announces a poor crop. A dry and cold January promises a good harvest.

Hints For The Victory Gardener

This is the thirty-eighth of a series of articles by this author dealing with the cultivation of ordinary vegetables.

THE TEPARY

By ROGER W. SMITH

A VIGOROUS row of beans probably yields more nourishing foodstuffs per square foot of garden space than any other garden crop. It is likely that the success of your garden is very largely measured by a consideration of how well your beans did. Success with beans often depends upon your ability to select a variety ideally suited to your location.

For example, extensive plantings of beans were made some time ago near Yuma, Arizona, which demonstrated that practically all varieties of beans originating in the cool humid east failed because of extreme summer heat and lack of moisture. Some plants, however, coming from seed of local origin thrived and out-yielded even the famous Mexican pink bean, the frijole. As you have guessed, this started a lot of people asking a lot of questions and doing a lot of work. Eventually they "discovered" the tepary.

The tepary bean, *Phaseolus acutifolius,* is an American wild bean native to the south-western deserts where it thrives on steep, rocky slopes and in narrow sheltered gorges. From prehistoric times the Papago and Pima Indians had cultivated this wild plant. Its seed was one of their most important food crops. Of these ancient and little known agricultural people little remains except what is left of their irrigation systems, the ruins of their cities, and the tepary.

In its cultivated form the tepary—you may find it in your garden catalogue under such names as the "Hopi Indian bean"—is known as *Phaseolus acutifolius latifolius.*

The tepary bean plant is well suited to thrive under desert conditions. It is very deep rooted. Its leaflets are quite narrow, its white or violet-colored flowers are quite small. Its flattened, beaked pod is only a couple of inches long. In the slenderness of its vine, the smallness of its leaves, the tepary is markedly different from the ordinary bean. Because of the flatness of its small, tough-walled pods, if you examined the plant casually, you might mistake it for a variety of small lima.

The small, rather round seeds of the tepary bean may be yellow, bluish-black, or white. The white seeds closely resemble white navy beans. But you can easily tell whether the seed is that of the true tepary or not by immersing it in water. Tepary beans become markedly wrinkled in less than ten minutes of immersion; ordinary beans usually require about an hour of such treatment before they begin to wrinkle.

Gardeners living in arid regions of the south-west find the tepary remarkable because of the ability of its seed to germinate in soil containing very little moisture. The plants are able to withstand periods of protracted drought and continue normal growth afterwards. Even during intense summer heat the plants will flower and form pods. Ordinary beans are quite unable to do this.

The teparies, however, do better

when the soil in which they grow contains a small amount of moisture-holding organic humus. On extremely poor, semi-desert soil, they get along but become bushy, low-growing. (This might give you an idea of how the dwarf, bush type of bean came into existence). The addition of a moderate amount of rich, composted material enriches the soil to such an extent that it causes the plant to assume a semi-vining or vining form and to yield much more heavily. Grown under any conditions closely resembling its wild surroundings the cultivated tepary is remarkedly free from insect pest and plant disease. When grown in cooler, more humid regions it is naturally apt to suffer from plant fungi.

But if you garden under "dry farming" conditions the tepary may fit nicely into your garden scheme of things. The rows should be thirty to forty inches apart with eight or ten well covered seeds sown to the foot of row. Early sowing is essential since the plants require a maximum of summer sunshine. The crop should be harvested before frost comes.

A few good rows of tepary beans should provide you with a nice supply of dry beans for winter use and the harvesting of these will offer few difficulties. When the beans are ripe, it is a simple matter to pull up the entire plant as the Indian gardeners did. Plants are stacked on a large canvas or on a clean floor and given a few days to dry out. After they are quite dry, the seed may be beaten out with a flail although, if you permit them the children will be glad to trample them out for you and they will have a happy time doing it.

Gardeners who know tepary beans say they are markedly "anti-acid" and in this way quite different from ordinary beans. The Victory gardener's wife will be glad to demonstrate for you that well cooked teparies are superior to ordinary beans, that they are mealy and light and definitely superior in flavor to the average lima.

After frost has come and your winter supplies have been carefully stored, you might run a handful or two of tepary beans through your fingers. You remember the slender, vigorous vine, the dry, sweltering day of summer. In such a moment you might also, perhaps, wonder about those tanned and almost forgotten American gardeners who developed this fine vegetable and handed it on to you, a valuable heritage.

Organics Praised by Rose Specialist

On the annual Rose-Grower's Day at the New York Botanical Garden, George A. Sweetser, Executive Secretary, New England Rose Society, pointed out the importance of organic matter. He gave five different reasons for its unparalleled value. Among them are two which are frequently overlooked: "In the soil organic matter, or coming from it, is practically all the nitrogen that is utilized by plants. Nitrogen is the growth element," he says before advocating the use of organic matter. And shortly after this, he adds: "In the soil organic matter there is practically every mineral element needed to support plant life." And he adds an interesting bit of information: "When the old-timers got Porto Rican molasses, they knew that it did them good, but they did not know why." Modern chemistry has shown that these molasses "contained virtually every mineral element needed to support the human body."

Organics Reduce Poisons

A Note by H. K. MEYER

IN connection with Mr. Barlow's article on poisonous plants, I wondered whether the organic method would so influence some plants that they might be less poisonous to animals and men. After all, if the amount of, let us say, hydrocyanic acid in sorghum, varies not only according to heredity, but also to environment, why should a well nourished plant not be free from a product that is of no particular use to it? Why should a normal plant have faulty assimilation? As luck would have it, the July number (1945) of the *Journal of the American Society of Agronomy* was waiting my reading. Franzke and Hume of the South Dakota Experiment Station had written a paper on the very question on which I needed information.

Hydrocyanic acid occurs in the seeds of bitter almonds, peaches, apricots, and even apples. Its taste is well known from canned cherries. It is said that the plant produces amygdalin which in the presence of water and the ferment emulsin changes into hydrocyanic acid. Approximately two parts of poison in a thousand parts of pits are natural. In this small amount, poisoning does not occur, for a lethal dose is much higher and people have recovered after taking 4 drams of the acid when their stomach was emptied. A druggist is reported to have swallowed one-half ounce of "almond flavor". In less than half a minute he became insensible.

A survey of the literature contains an item according to which the addition of nitrate of soda to soils poor in nitrogen, produced an increase in the prussic acid content of sorghums.

Every year we hear of deaths occurring due to sorghums and Johnson grass containing this acid. If the pastures or fields had been given the benefit of organic fertilizers, these deaths could have been avoided. For it was ascertained by careful experiments conducted by Franzke and Hume, experts in this line of research that "the application of stall manure to sorghum cultures grown on two soil types under greenhouse conditions resulted in a decreased hydrocyanic acid content as compared with unmanured cultures." Thus, the authors have summarized one of their findings. While some other statements seem to indicate that the moisture-holding capacity of the soil was one main controlling factor, there is no doubt that the form of nitrogen supplied had a separate effect on the sorghum plants in question. In other words, manure acted not only as a physical soil conditioner by keeping the soil in a better state of moisture, but it acted directly as fertilizer. For the *increased growth of the manured* plants was "always accompanied by a decrease in hydrocyanic acid content."

This is another strictly scientific confirmation of the fundamental principle on which organic gardening is operating. If you ask *why* organic nutrition produces healthier and even less poisonous plants, we do not as yet have an answer. The fact is that this method of fertilizing is superior to synthetic fertility. Not only can we rely here on old experiences, but also on recent events in the citrus and pear growing industries. Chemical fertility has proven inadequate, even when various health troubles in plant life were combatted chemically. Chemistry simply does not know enough about the behavior of plants and their nutritional requirements. Hydrocyanic acid or prussic acid is a very simple compound, signified by HCN, containing carbon, hydrogen, and nitrogen. It would offhand appear that nitrogen is nitrogen in whichever

form it occurs. But more and more data are coming to light which show that the old-fashioned theory of elements is not so simple as it once seemed. In fact, the discussion of the atomic bomb revealed to many people for the first time that the same elements may occur in different forms, chemically undistinguishable, but with widely varying properties. Where life processes are involved, the matter becomes even more complicated.

Such data as here described show conclusively that plants do not take up elements in pure form, but require at least some of their elements in compounds to which they are adapted by evolutionary processes. Nature does, with very rare exceptions, not deal in pure elements; it deals with complicated compounds. Only the laboratory technician knows purity. Nitrogen is an element, but Franzke and Hume have shown how much depends on the form in which plants are offered the element. They have also shown how important it is to supply nitrogen in organic forms if properly thriving plants are to result.

Not so long ago, we had considerable correspondence with several men interested in growing high-grade tobaccos that satisfy the discriminating consumer. One grower, Mr. Holman of Council Bluff, Virginia, has undertaken several experiments which convinced him that synthetic fertilizers can in no way produce the quality that organic fertilizers bring about. Similar observations have been made by others here and there, but rarely do we get such a wide view of the processes involved in plant nutrition as was offered by the article on the hydrocyanic acid content of sorghums. Such experiments clearly bear out the opinion of Sir Albert Howard that the synthetic processes of living plants function properly only when organic fertility is provided.

Mushrooms In the Kitchen

The best way to eat mushrooms is in form of a separate dish. Not only will you get the fine flavor to its fullest, but you will also most benefit by the concentration of nutrients. Mushrooms are best stewed over a low fire; as they contain enough water, you need only add some butter or, that lacking, beef fat or the fat from a roast, and salt according to taste. Do not fry the mushrooms, keep the heat low to get all the tender qualities. As mushrooms become harder and tougher by cooking, you want to watch the time. Ten minutes will usually be right. With commercially grown mushrooms, you need not clean off anything, but where the plants have been collected in the wild, it is best to cut them to eliminate worm damage and to clean out the gills. Shortly before serving, add a sprinkling of parsley. In this form, mushrooms will be most delectable and a fine substitute to meat dishes.

Soil Tests

By DORIS CLARK

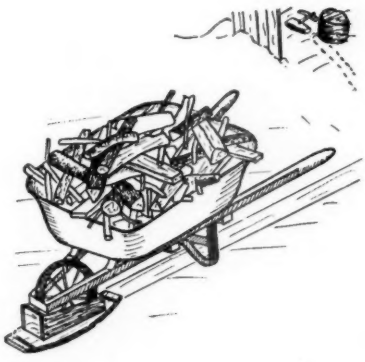
I HAVE never had my soil tested in all my life nor have I ever bothered a County Agent or an Experiment Station with samples of my soil. The reason for this is that I have never had any trouble with my gardens. My flowers and vegetables have always grown well because I followed conservative practices in helping them by supplying compost and occasionally bone-meal or leaf mold. There are constant requests at the *Organic Gardening* office from readers who wish to have the various plants listed according to their acidity requirements. In answer to this, we could quote many passages from Experiment Station Bulletins and Circulars stating that a fully correct soil analysis would be possible only if the soil were tested over a considerable period, since plant nutrients available in the soil differ according to the temperature and moisture conditions. We quote only one very fine statement by Professor Alex Laurie, who heads the Department of Floriculture at the University of Ohio in Columbus. It appeared in the July-August issue (1945) of the *American Rose Magazine*, under the title: "Is Soil Testing The Answer?" The well-known flower expert and Secretary-Treasurer of Roses, Inc., says: "As a matter of fact, the testing of soils for alkalinity and acidity as well as the available nutrients may be merely a guide for treatment which is not wholly reliable. Many factors enter into the complicated inter-relationships in soils." In another paragraph he says the golden words: "We usually assume that roses grow best in slightly acid soils (pH 6.0 to 6.5), and yet under perfect conditions of soil structure, water-holding capacity, drainage, and aeration, we have seen roses grow well at pH 4 (very acid) and pH 7.5 to 8 (alkaline). Even though we determine the reaction of our soil by test, we must follow through and, by actual growing experience, achieve the most satisfactory range under our conditions."

This warning and some others contained in the article only go to show what Dr. Meyer stated in his article on the pH question (*Organic Gardening*, May, 1945) that the plants themselves are the foremost indicators. They tell us by their growth whether they like the soil. It is true, however, that plants are so greatly adaptable to varying conditions, as they must be if they are to survive under often adverse weather and soil types, that they have different chemical composition according to the nutriments they receive from the soil. When they fail to respond, when they refuse to grow luxuriously or to bloom profusely, you can be sure that something is wrong. It may be the weather, it may be the variety which is too specialized for good adaptation, and it may be the soil. When you observe such a failure, you can, of course, go to your State Experiment Station and ask for a soil test. Unfortunately, the expert is apt to recommend a certain formula of commercial fertilizers by which you should doctor your soil. If, on the other hand, you want to heal your soil, do as many successful gardeners have done for centuries, even thousands of years: Make proper compost, enrich your soil organically, supply humus and make thereby the nutrients in the soil available to your growing plants. This conservative advice has worked in the past, long before tests were thought of, long before chemistry was available, and chances are it will work in your case. If roses grow over a wide range of soils with varying acidity, most other plants do the same. The need for testing arises seriously only

in one case: Where soils have been abused or where soil fertility is exported in the form of cash crops. In that case, it would be foolish to produce declining crops. But the gardener, who can so easily rely on organic fertilizers, is in a much better condition and need, in most cases, not worry about acidity. The only practical rule he must observe is this: If he lives in a limestone region which is alkaline, he cannot successfully grow cranberries. And if he has bogland suited for some berry cultures, he should not attempt to grow cacti in bog soil. For cacti do not care for acid soils. But between the extremes, there is always the wide range of garden vegetables and flowers which manage to grow everywhere.

This short article is not intended to belittle the scientific principles underlying scientific testing. But we do wish to tell gardeners that they need not worry. Their soils will grow what every neighbor grows if sound gardening practices are followed.

Gardening Devices



SNOW-SHOD WHEELBARROW

Before the arrival of automatic heating, in the days of the home woodlot, devices had to be designed to move large amounts of wood from the shed to the house. The *Snow Shoe* attachment shown in the picture converted an ordinary wheelbarrow into a sled. Utilizing the curvature of a barrel stave is logical enough. On top of this, you screw a box into which the wheel fits snugly. It is important to make the front board of this box sufficiently high and strong, because it is the part against which the wheel pushes as you move the wheelbarrow. If your woodshed is some distance from the house, you might make yourself such a Snow Shoe and ease the burden of wood carrying in winter.

Foundation Plantings—

Giving the Nurseryman Ideas?

By HEINRICH MEYER

ONE of our scientific readers has finally taken me up on one of my rash statements. Science is always wrong, I said, and he disagrees. But today's science has overthrown yesterday's authorities, and our present Nobel Prize winners will be laughed about a few years hence. It has always gone thus, and this business is generally called scientific progress. If you like physics, you'll enjoy the late Canadian humorist Stephen Leacock's essay *Common Sense and the Universe,* in which he shows nothing but the oscillations of ever wrong science. You will even more enjoy it if you dislike physicists. But just the same, I think I shall risk my neck again and disagree with another accepted belief, the belief in Foundation Planting.

Foundation Planting is, as everyone knows, the planting of shrubs or trees around the foundation of a house. These shrubs or trees are classified in numerous encyclopedias and gardening books. Some show a propensity toward shade, others must be mulched with peat moss because they thrive only in acid soil, again others won't grow above the frost-free zone, and so it goes on. The main purpose of the writers is to give a great variety of shrubs few people would recognize offhand, but which sound extremely attractive — they have fragrant chocolate-colored flowers and magnificent blue or red berries. Just the kind of bush we'd like to have. But it is only semi-winter-hardy. Well, we have winters, and we must resign ourselves to what other people grow around us. Let's take a walk.

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Neuweiler Residence, Bethlehem, Pa. by Edgar T. Clewell. Note the successful foundation plantings giving emphasis to the magnificent building. Tapering trees have a column effect.

We pass through the modest neighborhood of a small bungalow suburb. The houses are so close that you can smell your neighbor's breakfast sausage and that you must listen to their favorite radio programs, whether you want to or not. The lots are small and the strip of lawn between sidewalk or street and house is not exactly a wide expanse. But whether the small flagstone path leading to the front door is straight or snake-like, it ends invariably in two or three steps leading up to the front door. The odds are that right and left of these steps some creeping junipers were set out before the owner bought his house. At the corner, there is a yellowish evergreen shrub, just small enough to squeeze between the house and the driveway, and between the two windows on one side of the door, a somewhat more tallish tree grows taller to make the small house look still snugger and smaller. Your eye goes along the fifty-odd houses down the street and perceives without unnatural keenness, a similar arrangement in front of every house.

My architect friend tells me that most people want their house to be as much like that of their neighbors as can be arranged. I wonder if he learned this from a movie director. The movie makers seem to think that the majority want relatively stupid shows. Well, if it is true, I'm sorry—I don't belong to the majority. So let's step in the car and drive out

to Riverside or whatever the name of the more ambitious suburb. There you have the two-story houses in all styles of the schoolbooks, some in rough stone, some with towers, some modernistic, all with a bigger piece of ground. Invariably, you will see the more expensive shrubs, preferably the rhododendrons and azaleas. The big properties usually have a few trees on them and quite often grown-up trees had to be moved there with great care. But run your eye down the boulevard, nicely landscaped as it may be, without exception you will see the houses to the right, like the houses to the left enveloped in foundation plantings.

It's easy to sneer for a man who lives in a hundred-year-old farm house. In front of it grow hundred year old trees, a cherry, a red maple, and a crab apple. They don't interfere with light or sun, nor do they cover the house. Anyhow, there's more wall space than windows, and there would be plenty of room for foundation planting.

I did not even consider it.—

Ever so often when I drove through the southern states, I was charmed by the old places, however ramshackle and run-down they might be, because their builders had the good sense either to select a spot with beautiful trees or to plant sycamores, live oaks, magnolias or some other fine specimens. Now, a hundred years later, the house is set back from the road, has some flowers around it, but no bushes. The bushes and trees are away from the house. Ever so often when driving through the rocky West, I wished I could stay in one of those pine-surrounded places I passed. But the trees were closer to the road than to the house. The house is surrounded by air and light, the trees serve as windbreaks some distance from the house. They also can be seen in their beauty from the house. Every other region knows similar planning, whether it is maple or elm or oak country. The oldtimers built and planted so that they were separated from the world, but could see their trees and shrubs from the house. The foundation-planners seem to plant for the passer-by. For you cannot see those azaleas under your window when you stand inside.

The nurserymen would make bigger incomes if all people had my taste; for it takes an almost incredible lot of shrubs if you want them around your house, at some distance, hedgelike, whereas a dozen go a long way if you want to cram them right up against your foundation. In fact, a dozen may be ten too many, if you want my opinion.

When you think of *Yard Planting versus Foundation Planting*, you may not be aware of a revolutionary enterprise. But quite often we become innovators by doing what our grandfathers did and by disregarding what our contemporaries are driving at. Yard planting is more time-honored than Foundation Planting. The latter may have been a boon to nurserymen as well as the owners of suburban property, since it first allowed the introduction of some greenery into city planning. But yard planting is definitely the coming thing—more and more people looking for privacy and beauty of surroundings, fewer and fewer people doing things for show and display.

But I am not seriously campaigning for the nurseryman, I merely think of my own interests. I want to look out of my windows and see something growing that isn't grass. So I plant my shrubs around my property rather than around my house. But then, I am in the minority. I plant perennials and annuals close up to my house, a bed of flowers under my windows. And every morning when I shave, I can see the progress of the chrysanthemums or the gay display of my tulips. Then as the eye goes farther out, I see the lilacs and forsythias, the abelias and flowering quinces, and all the other shrubs, while the sun light can come to me right through the window.

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Fish for Supper, by Edgar T. Clewell. A successful spot along the hedge. Something to break a border—a home-made fish pond. Notice the water plants, a group that few gardeners cultivate.

Interesting Letters Department

Dear Mr. Rodale:—

I am a new subscriber but have been experimenting with compost for some years. First let me state the 1 acre hill I have is of clay, part being of a sand clay, other of red clay. The former owner, raised on a Georgia farm, informed me nothing would grow on this hill. I bought this hill in view of raising flowers when retiring at 65. I put out grapes, fig and fruit trees using plenty of leafmold. I knew nothing of organic gardening at that time which was over 20 years ago. In fact I had never grown a plant but loved flowers. The nurseryman furnishing my stock saw it 3 years later and was amazed at the growth. This set me to thinking about using oak leaves in a rotted state on everything I planted. How valuable your Magazine would have been to me at that time. However my experiments in making compost were interesting. Your suggestion of centre ventilation in the compost pile is well worth the subscription cost.

I have a bed of probably 3,000 hybrid amaryllis which need winter protection. Each fall I have the city street clean-up crew deliver 10 huge loads of oak leaves. These come in a dampened condition as the sweeper lightly sprinkles as it gathers the leaves. I should judge each load weighs probably 1½ to 2 tons. These are slid from the truck in a solid mass. As I do not need them for about a month they heat up considerably. At the first frost the amaryllis beds are covered with about 6 inches of loose leaves. During the winter the sun and rains weather these leaves and when placed on the compost pile soon break down.

My compost pile is under a large sweet gum tree. I have a framework of 1" x 6" boards placed 4" apart. This is needed to prevent birds from scattering the mulch. I place 8" sewer crocks, the joints separated about 8", these openings are covered with ½" hardware cloth with a flue of welded mesh 1" x 2". This makes an ideal central ventilation. I use oak leaves as a litter in the hen house, renewing same about every 30 days. The used litter being very rich in hen droppings and broken very fine, a layer of this is covered with a layer of half rotted leaves, a little agricultural limestone to lessen the acid condition. No earth is used as the leaves contain enough to meet the requirements. As the pile is shaded with the sweet gum tree no watering is needed. This pile is forked over in about 60 days and in another 2 months is a fine compost ready for use. As to kitchen waste, this is fed to the hens at each meal time thereby turned into rich manure. The chicken droppings are retained for a liquid fertilizer for potted plants.

Now as to results gained by composting: I am now dividing hemerocallis clumps, checking some of these I find as many as 140 divisions from a single plant set out 2 years ago. Many are given May-June as blooming season, some of these are still in full bloom the first of September. The blooms are larger than listed in catalogs and much richer in colors. When setting out the divisions plenty of half rotted leaves are turned under and each plant gets two fire shovels of rich compost. Then watered with a weak solution of liquid manure. This prevents the transplanting shock and they average a leaf growth of 1" a day until frost. The same is true of amaryllis as to increase. As a rule a healthy bulb will give two offsets, I have many giving up to 22 offsets, (I have snapshots to prove this). One

of the buyers for the largest seed and plant concern in the south suggested I send a soil sample for analysis as he felt there was a soil element on this hill not generally found in the state. When I mentioned composting he did not seem interested enough to talk on that subject. Can you explain why so many flower lovers will spend so much on plants then close their eyes when advised to try composting for their gardens. Isn't it a shame so many thousand tons of best fertilizer are yearly wasted in not saving the God given plant food.

As to earthworms. I find thousands in the half rotted leaves and many in the outer section of the compost pile. My soil now is so rich in all sections of the garden, it is with little effort, I can get a quart. When my soil was first turned over I never saw 1 worm. All my paths in the garden are covered with leaves to keep down weeds. Birds keep this stirred up looking for worms.

Arthur J. Jones,
Atlanta Georgia.

—o—

AN INTERESTING METHOD

I am a subscriber of Organic Gardening and it is one little book that holds first place with me. I am following the composting method of the Indore Process. It works out fine. My first heap went on the garden in exactly three months. I built the heap the latter part of June and about the same time in September I gave the garden plot the works. Then worked it well into the soil. It should show results next year. Now I have a method I am using to save every last thing of organic nature, but not until I am sure I am right will I feel satisfied. Here is how I work it. I have a small space set aside: it is about three feet by six. I build this space up the same as if it was a regular compost heap. We always have a few weeds from the flowers and garden plus the daily kitchen waste, which isn't much; but it goes on this small heap along with ground limestone and dirt. By the time that green stuff is available around June, I have a fair sized heap of mixed dirt and green matter that is fairly well decayed. Now when I build the regular heap, I use this pile of savings for the layer of dirt. *Is this idea practical?*

H. J. T., Bradford, Pa.

NOTE: We say it is! It is a wonderful method of getting material together for the time when the heap is to be built. If all material is thrown on the heap as it comes, the heap will not have the right height and the proper structure for heating. Heating, however, is aboslutely necessary to get the material broken down into good compost and to get weed seeds and other offensive matter destroyed. If a person has not got enough material to build a heap in one operation, he should save up as you do. And many gardeners will take your course, once they know that then they can get a heap that breaks down as it should.

—o—

RESULTS WITH ADOBE SOIL

This summer will complete my second season of gardening under organic methods. It has certainly been a revelation.—To the uninitiated it would seem too much to hope for—Soft, easily worked soil, freedom from insects and disease, bumper crops, friable seed, in fact all the results of honest organic gardening.

We raise a few rabbits, chickens, pigs, and have a couple of cows. The manure from these animals, the soiled bedding and other waste materials, that we used to burn, are all incorporated in properly built compost piles. The finished compost is then spread on the soil ready to be planted in one of many garden crops.

The type of soil we have in this area is commonly referred to as adobe. It has several bad characteristics, chiefly is it's ability to dry out and form a crust almost as hard as concrete.

The first couple of years that we tried raising vegetables in this soil we met with little success. The ground,

if wet enough to sprout the seed, would form a hard crust, through which very few plants were able to penetrate. The soil had to have almost exactly the right amount of moisture to work it. If it was too wet it would stick together and form lumps or if too dry it would be impossible to put a shovel or spading fork into it.

We were told by others who had had similar experiences that we were fighting a losing battle, and we were about to give up when we were introduced to "ORGANIC GARDENING".

This organic method was so logical, so like nature, that we decided to give it a fair trial. Well, to shorten a long story, it has been a tremendous success.

We have found that the soil does not pack, it does not dry out so readily, nor does it form a hard crust. We are able to raise all kinds of root crops, carrots, beets, parsnips, rutabaga, turnips, onions, that reach full size and are not split or divided as is so often the case in hard or tightly packed soils.

An agricultural teacher from a local school would hardly believe me that we were able to raise parsnips 2½ to 3 inches in diameter and 6 to 8 inches long.

We have found that in putting a new piece of ground into garden, that if we spread 3 or 4 inches of compost over the area, then thoroughly wet it down, in a few days the soil can be turned over and the compost mixed with it and from then on the ground ceases to be "adobe".

Robert Brumpton,
Hawthorne, Calif.

An Important Reference

From an important book
PLANT GROWTH, by L. E. Yocum, Professor of Botany, George Washington University, the Jaques Cattell Press, Lancaster, Pa. 1945.

"The organic matter of any soil can be increased by frequent applications of manure or other vegetable matter. It has such a profound influence on the soil that it should be given a great deal of consideration. Plant growth can be improved more by building up the organic matter of the soil through yearly applications than *by any other method with the exception of the use of water in cases of drought.* Organic matter not only gives a darker color to the soil which will cause it to absorb more heat and make it warmer in the spring, but it increases the water-holding capacity, since it may hold several times its weight in water. Organic matter decays slowly, forming acids which favor the dissolving of rock particles, and the decayed matter furnishes the food material for the growing plants. Recently it has been ascribed greater importance as food for the organisms that cause its decomposition. For example, the bacteria that live in the soil and fix the nitrogen must have large quantities of organic matter from which to get their food in order to reproduce, grow, and fix the maximum amount of nitrogen. Organic matter may some day be considered of most importance because of the soil organisms it supports." (p. 51f). This shows why the organic gardener gets better plants with better food qualities.

It's A Fact!

TREE PEONIES *differ from common peonies in that their stems do not die down during the winter. Many plant families have herbs as well as shrubs or trees in them. The rue is a herb, the related citrus fruits are trees.*

ROSE OF SHARON *is a relative of the mallows, hollyhocks, altheas, cotton, and okra. Its name is HIBISCUS SYRIACUS. They become easily mixed and offer a good chance for experimenting. You can raise hybrids from seeds.*

THE ROSE *and the apple are relatives. The fruits of the rose are called hips. They are extremely rich in vitamins and were used in Europe during the War when oranges and other vitamin-rich fruit were unavailable.*

LINNAEUS, *the* 18th *century Swedish botanist, who classified plants according to their reproductive organs, invented a system of naming plants, which is still in use. PASTINACA SATIVA L. means PARSNIP, SOWN, LINNAEUS-NAMED. First comes the family name, PASTINACA, then the specific name, SATIVA, then the initial of the godfather.*

NATHANAEL LORD BRITTON *started around* 1900 *to search for the original authors or inventors of names. The one who first classified a new plant under a new name got preference, even if others later on renamed the plant. Britton was Director of the New York Botanical Garden. His rules are now generally followed.*

INSECTS *are the most numerous living beings on earth. Compared with ONE species of MAN there are around* 650,000 *known species of insects. Among these, the beetles represent around* 250,000, *the butterflies and moths* 120,000, *and the roaches, grasshoppers, walking-sticks, and crickets* 20,000.

HOUSEPLANTS AS SANITARY AGENTS *is the title of a book published by Lippincott in* 1887 *and written by Dr. J. M. Anders. During the day, plants give off oxygen. Thus, they purify the air in a living room. At night, this process is reversed, and plants should therefore not be kept in bedrooms.*

NUTS *are sometimes bitter. It is said that they lose their bitterness if left out in the open for the winter. The squirrels always get sweet nuts when they dig up their buried treasures. Squirrels never steal nuts from each other's caches. If they were as bad as humans, they would long have extinguished themselves. Since they respect each other's stored winter food, they all have a chance to survive.*

MAPLE SUGAR *was made by the Indians, from whom the white settlers learned the practice. The process was first described about* 1700. *Not all maples yield the same amount of sugar and the government stations are now breeding high-yielding trees for future plantings.*

WILD HYACINTH *is the name of a native bulb plant, sold as CAMASSIA by the dealers. The bulbs are edible and were much used by the Indians. We grow them for their flowers, which usually come up early in May.*

DELPHINIUM AND LARKSPUR *are the same except that larkspur are the annual form of delphinium. Most plant genera have both annual and perennial species. For instance, Sweet-scented Marigold is a perennial, African Marigold an annual.*

SOME PLANTS *have males and females, just as people or animals. The common groundsel is such a plant. You can see male and female bushes blooming side by side.* Meyer.

Readings on Early American Fertility

By JAMES BUCKLEY

NOT so long ago, I came across an article in *The Northwest,* in which a pioneering couple developed a farm on virgin soil newly cleared from timber. The description of their beans and parsnips is so exuberant that we are reminded of earlier records of fertility. For compost gardeners these reports have a particular significance. If anything can be proven by historical records, the constantly decreasing fertility of our soils can thus be shown. Yields per acre were always highest in the days when fresh ground could be broken. This fresh land was, of course, ground rich not only in various minerals, but abounding with organic matter that had accumulated for centuries. Our early history is full of data which show that land was cropped until it became unprofitable; then the settlers moved South or West and took up new land. There are but few exceptions: Some tracts close to growing cities were kept in fertility by good gardening methods since these lands were permanently needed to supply vegetables for the markets of the towns. And in some regions settled by uniform groups of experienced farmers, such as the Pennsylvania Germans, were kept in what the British call "good heart" because these settlers were conservative, not eager to move away from their once established homesteads and therefore intent on keeping their lands fertile. But these are exceptions. The whole history of the southward move of the plantation system from Virginia and Georgia to Texas is one long story of soil depletion left behind.

If we ask the reasons of this irresponsible method of farming, we come immediately to the two controlling factors: Shortage and high cost of labor, whether consisting of free men or slaves, and great abundance of untapped land resources. If a farm could no longer be stripped, it could be abandoned, since new fertility beckoned further South or West.

When the conservative Europeans travelled across this country, they did not see these causes of the deplorable carelessness with farm and garden land, they only noted the fact. The great Swedish Botanist, Peter Kalm, after whom the Kalmia is named, travelled in the middle of the 18th century through the East and reported about his observations in *Travels into North America,* published from 1748 onward. He said that the farms looked slovenly and were overgrown with weeds, that the arriving settlers soon realized that they could get good crops without putting anything back into the land already fertile, and that they became careless as a result of this. In 1755, there appeared in London two volumes, entitled *American Husbandry.* Their author has never been ascertained, but their source value for conditions in revolutionary times is recognized. In it, we read statements such as these: "The American planters and farmers are in general the greatest slovens in christendom." Such statements, even if true in a wider sense, must yet be understood as the opinions of men who came with European standards and could not realize the conditions in a country with plenty of land and scarcity of workers.

Nevertheless, in those days standards were established which were to prevail for decades and almost over a century. In fact, it was not until the dust storms of the nineteen-thirties and the growing influence of the United States Soil Conservation Service made the menace apparent, that steps were taken to make a radical break with the wasteful past. People had the profit aspect so ingrained in their system and the casual habits of frontier times so absorbed that the harder methods of restoring fertility

by proper soil treatment were taken up only when absolutely necessary and, we might add, when financially supported by the nation's tax power. We are paying today for the waste of past generations. It was in the Southern states especially, but also methods of contouring, strip-cropping, and the fifty-odd other practices recommended by the Soil Conservation Service, were first and most strongly adopted: Here the soils had been most seriously depleted of their organic matter and mineral fertility.

From the gardening angle, relatively fewer reports are available; gardens are always kept more fertile than fields because they serve immediate human nutrition and cover smaller areas. Here also, the gardener can quickly see when his cabbages do not head, when his beans do not bear, when his peas remain stunted. In a grain field, the yield is less obvious and, under actual average farming conditions, more doubtful. Many a farmer cannot accurately say how many bushels of oats or barley he gets on his various fields. But we have some reports about early gardening too, for example, in the book of Count Solms who visited Texas in the first half of the nineteenth century. He comments quite unfavorably about the American practice of not raising the common kitchen vegetables in home gardens, such as he knew from Europe. He did, on the other hand, not see that the early settlers were more concerned with establishing a political system and taking land in quantity. They had neither time for nor interest in vegetable gardening. It is interesting, however, that gardens in the Southern states, dominated by Anglo-Saxon settlers, became to some extent the charge of the women. If gardens were wanted, the women had to take a hand in it. In Europe, gardening was a man's job; in America, just as many women took up gardening. In fact flower gardening has become one of the favorite hobbies of the woman gardener and, almost everywhere, a focus of social life. Most European garden organizations have more or less a professional touch or purpose, the American Garden Clubs are democratic and social, organizations of home gardeners rather than professionals.

In a splendid talk given on April 4, 1945, by Ray Fadden of the St. Regis Mohawk Reservation sponsored by the *General Electric Science Forum*, Schenectady, N. Y., many unusual data were collected about *Indian Knowledge of Nature*. It is commonly accepted now, that the Indians had a practical system of restoring soil fertility. In some regions they had cropped the same land for centuries, but kept up the fertility. It was often the new "settlers" who were nomadic and always on the move, selling their land and starting out anew, while the original inhabitants remained settled. Amon their fertilizers, wood ashes and nitrogen-rich animal matter, such as dead fish, were most common. The early settlers of the North-east are said to have learned from the Indians about fish for fertilizing.

If we want to find out more about soils and farm practices relating to fertility and yields in the 18th century, we can now resort to a splendid source book, published by the Rutgers University Press, New Brunswick, N. J., in 1941. Professor Carl R. Woodward gathered the data for a biography of Charles Read and entitled his book *Ploughs and Politicks*. This Charles Read was an unusual businessman and the story of his life reads like a novel; before the biographer started the detective work about his hero, he had in his hands an old volume in which many notes on 18th century farming were inserted by hand. How this hand was identified as that of Charles Read can be found in the book, and Lincoln scholars will get a little surprise on the side, but we are here more concerned with the notes themselves and their bearing on our question of fertilizing methods in early days.

Woodward says: "The dscription of crop growth in Read's notes indicates that New Jersey soils were richer in his time than they are now, but even at that early day they had lost much of their primeval fertility. Read and his

associates seem to have understood this, and realized that soil fertility plays a vital role in successful farming." And, indeed, as we go over the notes we find not only many different practices enumerated, but also careful calculations about the costs involved. Read did nothing less than government stations do now: he experimented with different layers of mud rotting organic matter, dung; he put sand on heavy marshy land and heavy mud on sandy soils, and compared his findings with those described in the agricultural literature of England. For Read also had a considerable library of the standard works of his day. Even methods of crop rotation to keep soils fertile were common knowledge by that time. Read also added experiments with different clovers and grass mixtures for his pastures.

How wise 18th century practice was appears from an entry which states that he let the mud weather and mellow in frost before applying it. Then it produced equal to dung in a corn field. "Next year he carried out and used the same quantity of mud from an adjoining bank, but it did no perceptible service, though on the same kind of land. The reason was, the first mud was loose and fibrous and resembled rotten leaves and wood, the last was blue mud." This is an extraordinary confirmation of the organic method.

It would be impossible to quote from all those entries, which deal with all conceivable aspects of farming and soils, but to give a picture of what all is contained, we mention a few items: Liming sandy and gravelly land, but adding also manure.—Dung rots sooner on level ground than in pits.—Lay no more than 20 loads of dung on clay nor more than 15 on sand. It is better to renew their surfaces the oftener. (Repeated applications are better than an excessive single manuring.) Pigeons, or hens' dung is incomparable, one load is worth ten loads of other dung.—Urine good for vines.—Fresh dung on corn brings weeds and the corn runs by too great a quantity of straw .—In Flanders they put earth and sand in their sheephouses and thereby 300 or 400 sheep will make a 1000 load of manure in a year.—Plow swardy ground shallow.—Peat moss, which is a spongy marsh mud, is an excellent manure.—If on early cabbage about June you cut the head and leave no more than two sprouts, they will come to small hard heads as sweet as a cabbage in June.—An acre of cabbage will keep twenty cows sixty-one days.—It has been observed by some that, of the peaches which have red stones, some are sweet, some not but that peaches which have a white stone are universally sweet.—Peach trees are apt to breed a worm at the root (Peach borer) which destroys them. The hulls of walnuts mixed with the earth keeps the worms from them. Clean them of the worms, then dig about one-half foot deep and a foot around and put in tempered clay.—Plant horseradish around plum trees and it is said it prevents the bug from destroying them.—In the year 1720 I took from a grape vine the young shoots that appear in May which were very tender. I pulled off all the lower leaves and, having well smeared with soft soap all the part I set in the ground, I planted it in fine earth made into mud by common water, and in less than six weeks they took root. The water of dunghills will destroy them.—Vines from layers bear the third year.

Many of these sayings are quotations which Read took from other authors, some he probably never applied himself, but only meant to keep for future purposes. But as they stand, available to modern farmers, they represent much valuable experience of agriculture and gardening in the days when yields were higher than they are now, though synthetic plant food had not in part replaced organic fertilizers. Organic Gardeners with an interest in early American practices in the East may not be able to apply all the methods of old Charles Read, but some are good enough; for they represent the experience of the ages.

The Vacant Lot

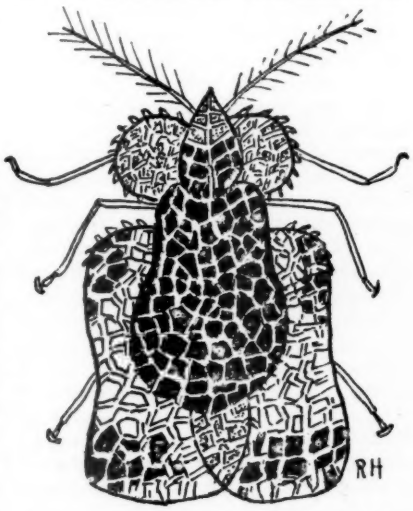
By RICHARD HEADSTROM

ONE winter's afternoon several years ago I happened to pass a vacant lot. There was nothing unusual in this for we all pass by vacant lots in our daily journeyings. There was nothing unusual about the lot either —it was like a thousand others, nondescript in character, unless one can give character to desolution and desolute it surely seemed to be for, as much as one could see, no living thing stirred there. The eye saw only the dead and withered stems of grasses and the slender stalks and branches of other herbaceous plants tracing delicate and intricate shadows on the snow. One saw too, of course, the solitary cherry tree, its naked branches revealing its particular individuality.

Perhaps a poet could have seen beauty in what he might have called its rugged individualism. Perhaps he could have seen beauty in the graceful and fantastic shapes of the snow-covered thistles, golden-rods and other compositae. But not being a poet all this was lost upon me and I saw nothing but a vacant lot, which, like so many other vacant lots, had nothing particular to commend it.

Had it not been for a flock of goldfinches which suddenly appeared, seemingly, from nowhere and took possession of it, I would probably never have given the lot another thought. But the birds, their bright summer colors faded to a more somber hue, engaged my attention and with growing interest I watched them climb about the naked branches of the thistles, sunflowers and other plants, picking the seeds from the naked pods with their little bills. Then, as suddenly as they had come, they rose as one and vanished in the distance.

Those of you who thrill at finding some unexpected wildflower or seeing for the first time some unfamiliar bird might understand why I went back to the lot a few days later in the hope of seeing them again. I did not see them, but I did find when I got there a lone tree sparrow hopping about on the snow. It was one of those mild winter days that seem to presage the coming of spring, but had it been blustery and cold, with the snow swirling about and stinging one's face like a million needles, this little bird would doubtless have been about and with cheerful, hardy industry doing his bit in helping the farmer and the gardener and all of us, for that matter, in getting rid of noxious weed seeds. Even now he was helping out, for as he hopped about on the snow he would now and then pick up some seed that had been scattered by the wind. He did not confine his activities entirely to picking up such seeds for at times he would fly to some brown stalk and meticulously go over it, picking out such seeds that still remained on it.



As I watched him I experienced the growing feeling that this vacant lot might not be so desolute and cheerless

as it seemed and that perhaps it might be a trysting place where I could rendezvous with such creatures that cared nought for swirling snows or icy blasts. Perhaps, too, if I poked about a bit I might find others, who, unable to battle the rigors of the winter season, had crept into some sheltered place to await the warm rays of the spring sun, to say nothing of those more timid who preferred to seek some cozy nook in which to sleep away in fruitless purpose part of their lives.

I am not given to procrastination and certain now that the vacant lot had much in store for me as I went over to a patch of thistles, bent on examining the dried up flower heads. They proved unproductive but fastened to one of the stalks by many ropes of silk, so that the storms of winter might not tear it loose, I found the pear-shaped egg-sac of the orange garden spider, the spider that often attracts attention in late summer and early fall, because of its large size, bright coloring, and the beauty of its web, which sometimes measures as much as two feet in diameter. I opened the egg-sac and found within a large number of spiderlings which immediately took to crawling all over my fingers. These spiderlings are cannibalistic, the stronger feeding upon their weaker brothers and sisters so that from an egg-sac that in early winter contains a large number of spiderlings, there emerge in the spring a much smaller number of partly grown spiders. Sometimes the egg-sacs of this spider are infested by Ichneumon parasites which in turn are preyed upon by secondary parasites.

Quite sure that I would also find the egg-sac of the banded garden spider, if I searched diligently, I spent several minutes looking about before I discovered one between the leaves of some herbs. This egg-sac is quite different in form, being cup-shaped with a flat top. In making this egg-sac the spider first makes the flat side and then attaches the mass of eggs to it, finally covering the mass of eggs with the cup-shaped portion.

While searching for this egg-sac, I had noticed some oval-shaped swellings on a number of golden-rod stems. These swellings were galls, those peculiar outgrowths that are found on almost every form of plant life, and wondering if I should find their makers inside I cut one open. It was empty. I cut open a second but this apparently served as a winter home for some spiderlings which emerged from it and ran in all directions. I was more fortunate with the third however, for inside I found a fat little grub, which would, had I let it alone, have eventually developed into a fly about the size of the common house fly but with cocoa-brown wings spotted with white and called, if you are interested, *Eurosta solidaginis*.

By their very conspicuousness, the tall dried spikes of several mulleins silhouetted against the sky invited inspection but although I examined them carefully I found them unproductive. Not so, however, the rosettes of gray-green woolly leaves from which the spikes rose, for as I spread the leaves apart I discovered packed between the leaf bases some thirty odd thrips, minute black insects which we often see threading their way in and out of various flowers during the summer. These insects have a number of striking peculiarities. Their wings, for instance, are very narrow, practically veinless, and fringed with hairs, and their feet are bladder-like. But the oddest feature is the mouthparts. They are fitted for sucking, although they actually are intermediate between true biting and true sucking mouthparts, and are asymmetrical or lopsided, only the left mandible being developed. The thrips, incidentally, had company in the form of several tarnished plant-bugs and a number of minute insects with which I was not familiar. The tarnished plant-bug is a very common species and is a general feeder having been recorded as injuring about fifty species of plants of economic value, such as the aster, dahlia and chrysanthemum as well as various orchard trees.

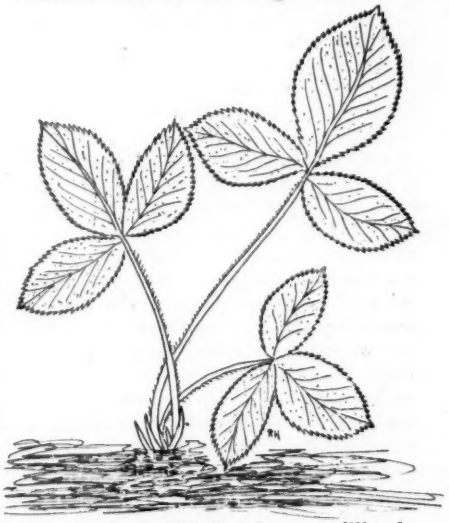
The mulleins were close to the sol-

itary cherry tree, which I have mentioned, and on the twigs I found the characteristic egg masses of the tent-caterpillar and a number of leaf-enfolded cocoons of the promethea moth. Should you chance upon these cocoons examine one of them and note how cleaverly it is made. As I was examining the flimsy yet durable structure, a flock of juncoes settled in the field and chattered away as they searched for seeds. Sometime later a gray squirrel paid the lot a visit but apparently finding nothing of interest scampered away and was lost from view.

The number of animal forms which I had so far come upon in the lot now came to eleven. Perhaps not an imposing number but considering the desolute-appearing character of the lot yet a surprising one, and there still remained a number of likely-looking spots to explore. As the past few days had been somewhat mild a thaw had set in exposing the ground in a number of places. In one such place spreading strawberry leaves had been uncovered and on examining them carefully I found on the undersides a number of lace bugs, small and delicate and, when seen through a lens, beautiful insects. Having resolved to examine anything and everything, I carefully looked over some sorry-looking stalks of butter-and-eggs and found attached to one of them, a silken tent inside of which were a number of caterpillars of the Baltimore, a butterfly which is usually found in swampy meadows during June and July.

Since a great many insects feed on various grasses I felt it quite possible that some of them may have made their way down among the roots, there to spend the winter. Taking hold of a thick tussock, I pulled it loose from its anchorage in the ground and among the roots found three squash bugs, several leaf hoppers, half a dozen strawberry weevils and several others of what species I was not sure.

So far I had made no effort to look beneath the few stones which I had come upon but now, I decided, was as good a time as any to see what animal forms, if any, were hidden beneath them. I selected first the largest and with considerable heaving managed to overturn it. The results were negative. The stone was really a small boulder and few insects are to be found beneath boulders where they must tunnel into the hard earth because in such situations they can secure only moderate protection against cold and little food. The smaller stones likewise were unproductive because they, on the other hand, were too small to afford much protection against the elements but beneath one of the larger stones I found a carabid beetle, a millipede that immediately disappeared into the soil, and a sow bug.



I added these to my list and for a moment hesitated undecided as to whether to continue my explorations for by now the shadows were beginning to lengthen. A chill in the air warned me that I had done enough exploring for an afternoon. I added up my list and found that the number of animal forms which I had discovered in the vacant lot came to nineteen (not including those which I could not name) and with a feeling that I had spent a profitible afternoon I closed my notebook and went home.

Over the Fence

by H. K. MEYER

In our book *The Fruit Orchard* we praised the Calville apple. This light green and pale yellow apple is very juicy, has a fine flavor, not too much sugar, and has withstood attackers and pests so successfully that it became one of the standard apples in Europe. Its origin is probably in France. Quite recently, our praise found an unexpected support, as the *Wall Street Journal* shows, which reprinted an item on the vitamin content of this apple. This apple has almost as much vitamin C as the orange. Apple growers who had to give ground to citrus growers, especially since the eating public became vitamin-conscious, have a new entry with the health-conscious when Calville apples become more widely planted. I am curious whether our plug for the Reinette and the Parmaene, two very tasty apples, will also get some support from the science corner before long.

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Our correspondent, Mr. Howatt, sent us *The Miller Analyst,* in which an item from the *California Cultivator* is marked. R. E. Stephenson wrote there as follows: "Animal manures are both direct and indirect sources of essential plant nutrients and the growth-promoting hormones, without which maximum crop yields are impossible." These growth factors cannot be added to soil or compost heap by any other means. It is especially interesting that the *Miller Analyst* is published by the Miller Chemical and Fertilizer Corporation in Baltimore. Such support from the fertilizer industry is always welcome.

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The *Seedburo Equipment Company,* Chicago 6, Ill., sell all sorts of tools and equipment needed in the seed business. Among them is a torpedo which holds a thermometer, with which one can check up on the temperature inside a heap of grain or in a compost heap. However, grain does not heat as much as compost, of course, and a thermometer with a larger scale would have to be substituted. In writing about this to the firm, we received a very practical answer: "Take an ordinary piece of pipe and push it down into the compost and then insert by means of a piece of string a thermometer that could be dropped down inside the pipe." This should be quite suitable if the thermometer registers up to about 180° (F.).

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There is much talk of trace elements needed in human, animal, and plant nutrition. Most of these elements are picked up by the plants in very small parts and thus get into the animal systems with the food. If they are absent serious diseases may result. When cobalt is missing, the number of red blood corpuscles decreases. In certain soils of Australia and in parts of Florida, animals became sick through lack of cobalt. Similar materials that have been discovered in milk and that,

therefore, enter into the nutriment of the young, were aluminum, barium, zinc, boron, lead, silver, strontium, titanium, and vanadium. Cow milk and human milk also contained molybdenum, which was absent from goat milk, while rubidium was found in cow and goat milk, but not in human milk. It is, of course, not known which function all these traces of elements have in the plants, animals and men. For even if a plant picks up an element, this does not necessarily mean that the element is necessary for the plant.

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A Munich Doctor's thesis turned up in the office. The writer published 84 pages on commercial fertilizers as damaging to health. The bulk of the material is from official records dealing with insurance claims. Most of the cases which the young M. D., L. W. Bornschein, discusses deal with irritations of the skin and the mucous membranes of eye, nose, and throat. There were a considerable number of deaths, vascular and heart afflictions, and haemorrhages. The booklet appeared in 1936 and digests much international literature in addition to the records of the state of Bavaria.

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How many people do not like good food? The interesting Bulletin 318 (West Virginia University, Morgantown, 1945) by Hazel C. Cameron, *A Nutrition Study of West Virginia Students,* gives a report on tests with one hundred students. Twenty-five of them expressed a dislike for liver, thirteen women refused to eat eggs, though most men liked them, but less than ten did not care for prunes or spinach. Men ate 7-8 slices of bread a day, women about 5 slices. The men drank more milk than the women, about a glass more every day. It was in the end found that, while at school, the students ate better and showed improved health. When they took in good amounts of vitamin A, found in liver, meat, beans, parsnips, apples, milk, etc., the duration of common colds was greatly reduced.

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With aluminum production increased during the war and now capable of filling all demands, aluminum windows are coming into being. The farmers will benefit by an aluminum adder, developed by Oregon State College, which weighs only two-thirds of the standard wooden ladder. Of course, where there is a cold winter, you had better not touch the metal with bare hands when you move the ladder from one tree to the next.

At Lake Alfred Citrus Station in Florida, they found that fruit injury from frost decreased as trees were well nourished. Another example of the importance of proper plant nutrition for healthy growth.

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Without bees to pollinate flowers, at least a hundred thousand different plant species would disappear from the earth, is the estimate of the well-known naturalist Edwin Way Teale. *Citrus Magazine,* August 1945, contained an item about the dangers of DDT, in which a quotation appears from Agricultural Commissioner N. Mayo: "Every experienced citrus grower will remember the fight against the cottony cushion scale several years ago, in which imported friendly insects were the only effective control. Vegetable growers know what a part the little-winged wasps play in holding aphids in check." We would add the lace-wing fly and the lady beetle, known to every gardener as helpers, and we join in Mr. Mayo's question whether we may not destroy more beneficial insects than harmful ones when the "over-all" craze of DDT takes a hold.

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A good saying by Professor R. G. White was recently reported in *North Dakota Horticulture.* White said to his classes: "Live as if you were going to die tomorrow; farm as if you were

going to live forever." This advice should produce the far-sightedness the good farmer needs—thinking not of a present gain, but of constant betterment of land and livestock.

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H. R. Smalley of the National Fertilizer Association wrote an article on *Organic Matter—Cash for Your Soil Bank* in *Successful Farming*. He says there that practically all the nitrogen in the soil, which is, of course, the most important plant food, occurs in combination with organic matter. It is good to know that the fertilizer industries have come to emphasize the organic angle without which no successful farming or gardening is possible.

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When you buy an apple which has a slightly rotten spot at the calyx end, where the remainders of the flower show, you can be reasonably certain that this injury was caused by arsenic spray. First it caused a burn, then the black spot started to rot.

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T. J. Talbert, *Commercial Grape Growing in Missouri,* Missouri Bulletin 484, comes out strongly for organic soil treatment, not only in the interest of preserving the soil, but also for the purpose of getting better grapes. He says in fact: "Manure generally gives better results than a complete fertilizer or nitrogen alone." In other words, an organic fertilizer is superior to a mixed commercial fertilizer. If manure does this wonder, a good compost should work even better. This is only logical. Just see where wild grapes grow! In the hedgerow, where plenty of organic leafmold is accumulating.

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Differences in nutritive value of wheat have been definitely traced to fertilizer treatments, as appears from *Fertilizing Wheat for Yield and Quality*, Oklahoma Bulletin 285, by H. F. Murphy. If different synthetics produced different protein, it stands to reason that a balanced compost would, as Sir Albert Howard, has frequently intimated, produce a balanced protein. The Oklahoma determinations were limited to protein quantities, but in view of the innumerable proteins in existence or possibly to be discovered, which we mentioned in the same column in December, we may not be wrong if we believe that proteins differ also as to quality.

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Professor Bear of Rutgers University recently discussed Soil and Health in *The American Fertilizer* (vol. 102, no. 11). An interesting statement of his: "Reports from Finland suggest that people located in regions of acid soils are more subject to tuberculosis than those living in high lime areas." Following up this lead in German statistics, I find a high tuberculosis incidence in the sandy areas, which would normally have higher acidity. Thus more and more data show the correctness of our fundamental position as Organic Gardeners.

Who Sent Us "MY GARDEN"?

A seven page article, entitled MY GARDEN and illustrated by the author, arrived at the office. No indication or address of the writer was given. We would like to print the article and send our usual royalty. Will the author please step forward?

Hala Kahiki--The Hawaiian Pineapple

By OTTO DEGENER, New York Botanical Garden

A FRUIT many of us have enjoyed for dinner this peaceful Christmas is the pineapple. Due to successful advertising and business methods we generally associate pineapples with Hawaii. The particular one we are eating very likely grew within ten miles of Pearl Harbor. Nevertheless, the plant is not native to Hawaii but probably to Brazil. Some authorities state that Columbus discovered the pineapple in the Island of Guadeloupe in 1493.

The pineapple was first brought to Europe around 1650, several fruits being given to Oliver Cromwell in 1657. About a hundred years later it was being grown under glass in France and England. Pineapples had somehow reached the Hawaiian Islands before their discovery by Captain Cook, probably as part of the food supply of a Spanish galleon shipwrecked on some voyage between Mexico and the Philippines or the Moluccas. The Hawaiians, calling the plant *hala kahiki,* cultivated it for its sweet, prickly fruit which became a welcome addition to their otherwise somewhat monotonous diet of *poi* and pork or dog. In the 1850's the whaling fleet, wintering in Hawaiian waters, furnished the natives with a ready market. In 1885 a Captain John Kidwell established the first real plantation in Hawaii of this rather wild type of pineapple. This covered about five acres in the present outskirts of Honolulu. The fruit, though very sweet, was small and not fit for export.

The Hawaiian pineapple on our dining room table has been highly improved by the gardener. One of its ancestors came from the vicinity of Cayenne, French Guiana, and from there was introduced into France where it was grown in the Royal Kitchen Gardens of Versailles in 1841. It was grown as a hothouse luxury and curiosity. Some of these French plants came to Kew Gardens, England, where they were probably crossed with other South American strains. The greatly improved offspring were shipped to Queensland, Australia about 1854, and to Jamaica for planting on a large scale. Dissatisfied with the Hawaiian pineapple or *hala kahiki,* Kidwell in 1886 imported into Hawaii some of these improved plants from Jamaica, while the brothers E. W. and R. A. Jordan imported the same kind a few years later from Queensland. These plants, known as the Smooth Cayenne because of the absence of spines on the leaves and because of their country of origin, were grown to a rather limited extent at first, being sold locally and in San Francisco as fresh fruit only. Today 60,000 acres are planted to pineapple in Hawaii, producing $60,000,000 worth of fruit.

Due to losses from decay in shipping the pineapples to California, Kidwell and John Emmeluth, a plumber, thought of canning the fruit. In 1892 the cans for this purpose were first laboriously made by hand in Honolulu, then imported from California. To reduce the high expense of shipping these bulky objects, flat sheets of metal were brought from the mainland and rolled into shape in Hawaii. Since 1905 the Hawaiian pineapple has become second only to sugar-cane in island importance.

The common wild pineapple plant with spiny leaves, such as the one I collected in the Hawaiian Islands and are here shown, has a short, thick stem. This can act as a storehouse for reserve plant food during unfavorable seasons. It bears stiff, strap-shaped leaves, sometimes a yard long, arranged in a dense spiral. These are grooved along the center. In the axil

of the clasping base of each of these leaves are a dormant or resting bud and so called adventitious roots. These roots, plainly shown at the base of the plant where I stripped off the leaves to lay them bare, are of great importance. Dust and dirt blowing upon the leaf surface cannot be absorbed. But the first rain washes such material down the groove, like a gutter, to the clasping base of the leaves. The adventitious roots then come into play, absorbing the water and soluble parts of the wind-blown particles. Thus the pineapple not only gains its regular amount of raw food through the roots it has anchored in the soil, but it gets an additional supply from the rootlets at the moist dirt-packed base of each leaf.

Hawaiian soil consists almost entirely of decayed lava. It is usually red, like rust, due to the presence of much iron. This element, however, is too firmly combined with other substances in the soil for the pineapple plant to absorb a sufficient quantity to keep it in a healthy condition. Hence these iron-hungry plants grow pale and sicken. The growers have solved this problem. The islands' scrap iron and junked autos are cast into huge vats of sulphuric acid where they slowly dissolve to form iron-sulphate. This, in proper dilution, is sprayed on the pineapple plants. It gradually washes down to the roots coiled in the bases of the leaves, is absorbed by the roots and restores the yellowish, weak plants to green, robust health. As you eat your portion of pineapple, remember that you are very likely eating some Hawaiian's junked car!

The fresh pineapple, as it comes to the States, is a very interesting fruit for study. At flowering time the shortened stem of the pineapple plant lengthens several feet. The upper part enlarges and forms a large number of purplish, three-petaled flowers, each in the axil of a single degenerate leaf, called a bract. Instead of stem, bract and lower part of flower being distinct and separate, however, they are firmly united, as the longitudinal section of the drawing shows. Topping all is the continuation of the stem bearing a crown of small leaves.

With age not only do the individual

flowers of the plant ripen into fruit, but the bracts and main stem likewise become fragrant and filled with the sweet, acid juice so familiar to all of us. The stem is the solid "core" of the pineapple, cut out and represented by the hole in canned sliced fruit. The entire complex structure known as the pineapple proper, is botanicall termed a collective fruit. When dead ripe and golden, it bends over and in that state is an attractive food easy to get at by birds and various four-footed animals. In eating it they break off the terminal crown of stem and leaves. This crown, practically no matter where it falls, strikes root. Thus, if conditions are favorable, the hard ridged seeds, about one-eighth of an inch long, reproduce the pineapple sexually wherever they are voided, with a welcome contribution of manure, far from the parent plant. The crown, on the other hand—actually a cutting made by nature—very likely reproduces the pineapple asexually in the neighborhood of the old plant. Though the highly improved cultivated plants almost never produce seeds, rudimentary ones are plainly visible on slicing the fruit.

Even though the pineapple thrives in well-drained soil from sea level to an elevation of 1,500 feet, it is grown in the Hawaiian Islands chiefly above the sugar cane belt, or on land naturally too dry for cane and impracticable to irrigate. The plants are propagated in many single rows in the field; or these rows are massed together in twos, threes of even fours. For this purpose cuttings of several kinds are used: suckers, crowns, slips and stumps. Suckers, the young shoots arising from buds in the axils of the lower leaves, are gathered shortly after the fruit from the old plant has been harvested. When planted they can develop ripe pineapples within fifteen to twenty months, the quickest possible time. The crown of the pineapple plant, consisting of the stem and cluster of leaves that surmount the collective fruit, is saved at time of canning. After planting the crop develops rather uniformly, nearly all the plants fruiting at about the same time. Slips, arising from degenerate flower stalks at the side of the main one, are not very different from suckers but mature the fruit a little later. Stumps, as the name implies, are the basal parts of old plants. These were formerly much used to produce an additional supply of plants for setting out in the field. When the suckers, crowns and slips are ready for planting, the rows are covered with a special strip of strong paper, in which holes are cut at regular intervals. A cutting is then inserted in each hole, the paper not only acting as a mulch to retain the moisture in the soil but also to prevent the growth of weeds in the rows and to raise the soil temperature. This paper is allowed to remain in the field, where it finally decays.

After the first crop of fruit has been harvested, the old plants are bereft of all but two suckers which are left to produce the following harvest. This is spoken of as a ratoon crop. A good field may even yield a second and a third profitable ratoon crop. Finally, about five years after the first planting, the mass becomes so tangled it is best to plow it under and to plant the field to some other rotation crop before returning to pineapple.

Besides the pineapple's prime importance of providing man with tasty food and drink, it has other uses, albeit modest ones. Surplus chemicals in the juice are made into citric acid. Left over rind and other waste is used as stock feed, converted into alcohol or fertilizer; while the long, narrow leaves furnish the superior fiber from which thin, translucent pina-cloth is manufactured in the Philippines and elsewhere in the Orient.

Reader's Correspondence

Send stamped self-addressed envelope for reply.

OVER-HEATING IN COMPOST

Q. There is one thing I would like for you to explain about the compost heap. I saturated each layer with water as I made it which I understood is according to directions. In two or three days it gets very hot, so hot that when I made the holes in it with the crowbar, according to directions, they emitted smoke. But on digging into it a little I see that it is turning to ashes. I have always understood that for a manure pile to heat and turn to ashes ruined it. I therefore put light sprinkle of water on it and again saturated it, but not enough to run out on the ground. That had the effect of stopping the heat. I understand that it should heat—enough to kill the weed seed, but how can it heat without turning the inside to ashes and ruining, and if you water it, it stops the heating?

L. W., San Antonio, Texas.

A. It appears that your manure contains too much nitrogen for the green matter. The heap should definitely not heat to the extent you describe. We have never had such an experience nor heard of any. Did you build the heap as follows: Six inches of green matter, two inches of manure, a sprinkling of earth and lime, etc.?

If under San Antonio conditions, heatings must be delayed or slowed down you could achieve that 1. by keeping the heap a little drier, which would produce less bacterial activity. 2. By covering the heap better, which would cut down on air and thus produce less bacterial activity. 3. By using slightly less manure.

ASPARAGUS

Q. Although frosts have cut down all else in the garden (save turnips) the asparagus foliage remains green and luxuriant. I *need* that vegetation for compost. Would it be injurious to the asparagus to cut the foliage down to the ground now—before it dries from cold?

My asparagus bed is very rich. The asparagus leafage is enormous and the weeds—despite several summer weedings—are very vigorous. How can I best deal with the weeds in the year ahead. Salt? Is that kosher? I am inclined to think that it would not please earthworms or microbes. Am I right? Would mulching with sugar cane trash used as hen-house litter be the answer?

T. L. Mc C., West Redding, Conn.

A. Keep your asparagus growing until it dies down. As long as the leaves are green, they are active and add nutriments to the storage roots. Your little asparagus treelets are now making next year's asparagus. I should not use salt to kill weeds even though old gardeners have used small amounts of salt in asparagus beds. You would not be able to do away with cultivation but would hurt your plants if you applied amounts sufficient to kill off weeds. You should be able to use a hoe and then a mulch, such as you describe. However, by adding hen-house litter, you will increase the nitrogen in the soil and also cause further vegetative growth.

—o—

SPANISH MOSS

Q. As you will note I live in the subtropical climate of Sarasota, Florida. Would the humus made by compost-

ing be suitable for citrus trees, without any other plant food? Spanish moss is plentiful here; would it be satisfactory to use in the compost heap? Stable manure is scarce and expensive here; would refuse from a fish market be a substitute for manure in the compost pile? For your information, this is an extremely sandy soil, and yet certain vegetations seems to thrive exceptionally well.

M. B. J., Sarasota, Fla.

A. Spanish moss makes a very good material, but you must be sure to add enough nitrogenous material to get proper plant food. Manure, of course, contains certain hormones and bacteria for which there is no substitute in any other form, but if you cannot get it, you should at least try to supply enough nitrogen in other forms such as dried blood or the fish scrap you mention.

In the latter case it might be well to let it partially decompose under heavy cover of Spanish moss, etc. and then to apply this material to the heap because otherwise you will have trouble with the breaking down. Such material is well suited to use in the citrus orchard, especially on sandy soils.

—o—

PEANUT SHELLS

Q. I have used peanut hulls around my trees and as it decays plan to use more. Am told that two or three inches of these (As a MULCH) is equal to eight or ten inches of straw. Will these hulls hinder the air from getting to roots of the trees and thus do perhaps as much harm as good? I do not stir the soil which is covered by the hulls as I want the hulls to hold down the weeds.

Will appreciate your advice. It is a wonderful thing for the farmer or fruit and nut grower to have a place like yours to go for GOOD ADVICE and I'm willing to pay you for it.

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Emmaus, Pa.

coffee grounds good fertilizer?

C. Mc C., Pearsall, Texas.

A. Peanut shells are just right for your mulches. They will not keep the air out. I would not use lime at this time if you allow the leaves of your fruit trees to decay under your trees. They replenish the soil with lime. If you should find a falling off in yields, you can always add small sprinklings, but do not overdo it. While lime does not harm the earthworms in small quantities, it makes much phosphorus available and you would, therefore, have to add also to the sources of phorphorus before long.

—o—

COVER CROPS AND COMPOST

Q. Last year we planted rye as a cover crop. Do you recommend a cover crop—or does it in growing take more out of the soil then we would disk in? Which cover crop would you recommend? We have chicken manure in quantity.

A. D. L., Rochester, Mass.

A. A cover crop is all right, especially if it is a legume crop such as winter vetch. When you work it in the ground next spring, you will, however, have to add some nitrogenous matter since otherwise the nitrogen in the soil will be tied up in the breaking down of the green matter while your growing plants will be deprived of it. Legume crops are as a rule richer in nitrogen then grasses and need, therefore, a smaller amount of added nitrogen, but of course, you should have no trouble with nitrogen, having chicken manure available. It is a fine source and will, together with your cover crop, greatly benefit your land.

—o—

GOOD BACTERIA

Q. May I ask *how good bacteria may best be created in the soil?*

H. P., Miami, Fla.

A. As organic material collects in the soil, bacterial action increases, pro-

vided that the bacteria get both energy food and growth food. Energy food is derived largely from carbon material such as plant residues while growth food derives from nitrogen such as is supplied by animal manure, hoof and horn meal, dried blood and the like. This is the same as in human nutrition.

—o—

ONIONS

Q. I would like your advice on a certain problem that has been causing me trouble for the last several years. This particular problem has to do with the keeping of onions over the winter.

We have always been fairly successful in raising them but when it came to keeping them, we were not so successful. Our usual method for keeping them for the winter, was to dry them in the sun for several weeks and then put them either into an onion bag or a bushel basket. This method has not proven successful.

Do you cut the seeds or the balls from the onions before they are matured?

What do you do with your onions to keep them over the winter?

What do you think of the idea of placing onions in sand that has been previously dried in the sun?

J. M. S., Glendale, N. Y.

A. You should try to get an onion variety, which does not go to seed, because seeding reduces not only the keeping quality of the bulbs but especially the food value. I should suggest that you get in touch with several seed firms for suggestions or get the recommendations of the New York State Experiment Station at Geneva, New York. If onions are thoroughly dry, they keep well when spread out in not too thick a layer. I should not recommend storing them in bushel baskets. Placing onions in sand will work out if the weather is dry and if the amounts are not too large, but normally, there is no need for it if you have healthy bulbs to store.

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